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Food Technology Abstracts

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FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

24 JUN 1991
C. F. T. R. I., MYSORE

GENERAL

260

Adebona (MB), Ariahu (CC) and Ogunsua (AO). **Effects of season on the bacterial flora, proximate compositions and mineral contents of the tropical periwinkle (*Tympanostomus fuscatus*).** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 55-58

The bacterial flora and the mineral contents of the fresh periwinkle (*Tympanostomus fuscatus*) investigated for 1 yr at quarterly intervals exhibited significant seasonal variations. The periwinkle harbours indicator organisms such as coliforms, *Escherichia coli* type 1 and faecal streptococci and pathogens such as *Salmonella* spp., staphylococci spp. and *Vibrio parahaemolyticus*. Both indicator and toxigenic microbial counts were within the safe limits specified by regulatory bodies. On a dry wt. basis, *T. fuscatus* contains 61.5% protein, 0.055% Ca, 0.036% Mg, 0.8 p.p.m. Pb and 3.5 p.p.m. Sn. The minerals showed peak amounts in the rainy season. AS

261

Baghurst (K). **Social factors and the changing food supply.** *Food Chemistry* 42(1); 1990; 44

262

Mukai (T), Toba (T), Itoh (T), Nimura (T) and Adachi (S). **Carboxymethyl kefiran. Preparation and viscometric properties.** *Journal of Food Science* 55(5); 1990; 1483-1484

Carboxymethyl (CM-) kefiran was prepared with monochloroacetic acid in isopropyl alcohol at 30, 40 and 50 C for 4 and 24 h. Resulting CM-kefiran varied in degree of substitution (0.73-0.89), mol. wt. (5.0-7.0 x 10^5) and viscosity (4.5-14.5 cP in 0.5% aqueous solution) depending on the condition. Carboxymethylation resulted in a max. fourteenfold increase in viscosity. ^{13}C-NMR spectra of CM-kefiran indicated C-6 of native kefiran was preferentially substituted with CM-groups. AS

263

Vic Morris.. **New ways to structuring food.** *Food* 11(11); 1989; 47, 49, 51

FOOD PROCESSING

264

Lewis (M). **Making products sterile.** *Food* 12(3); 1989; 35-37, 41

This article explains the conditions necessary for successful aseptic processing and packaging. BV

265

Likimani (TA), Sofos (JN), Maga (HA) and Harper (JM). **Methodology to determine destruction of bacterial spores during extrusion cooking.** *Journal of Food Science* 55(5); 1990; 1388-1393

A methodology was developed for determining destruction of bacterial spores during extrusion cooking in a single screw extruder. Procedures were developed for estimating processing time at different screw speeds and calculation of "D-" and "Z-values". The proposed methodology evaluated destruction of *Bacillus globigii* spores in 18% moisture corn/soybean mixture (70/30%, w/w). "D-value" expressed on the basis of average time at mass temp. 95 C during extrusion was the most conservative estimate of spore sensitivity. Times ranged from 1.7 sec at 115 C to 6.6 sec at 100 C max. mass temp. These D-values" resulted in a "Z-values" of 25.3 C, similar to that reported for the same strain with dry heat. AS

FOOD PACKAGING

266

Ojha (CS), Alam (MS), Seth (PK) and Srivastava (SP). **Global migration from food packaging plastics into aqueous and acidic extracts. An experimental comparison.** *Indian Journal of Environmental Health* 32(1); 1990; 5-12

Effect of some physico-chemical factors such as pH, temp., sunlight and the storage time on the global (overall) migration form lunch boxes were examined in aqueous and acidic media using the guidelines recommended by Bureau of Indian Standards (BIS). Our results demonstrated that the global migration increased with the increase of temp., extraction period and acid pH. Sunlight also enhanced the rate of global migration in comparison to the migration obtained in a hot air oven maintained at identical conditions of temp. and durations. It was worthwhile to note that the migration of chem. additives ceased after the extraction period of 80 h (at 35-40 C), as the global migration obtained after 80 and 120 h of extraction period were found to be comparable. AS

FOOD ENGINEERING AND EQUIPMENT

Engineering

267

Ashwini Kumar), Bhattacharya (M) and Blaylock (J). **Numerical simulation of natural convection**

heating of canned thick viscous liquid food products. *Journal of Food Science* 55(5); 1990; 1403-1411, 1420

268

Dutta (B) and Sastry (SK). **Velocity distribution of food particle suspensions in holding tube flow. Experimental and modeling studies on average particle velocities.** *Journal of Food Science* 55(5); 1990; 1448-1453

Average particle velocities of model food particles were investigated by video taping particles suspended in sodium carboxymethylcellulose solutions during passage through a transparent holding tube similar in dimension to that of commercial aseptic processing systems. Results indicated that mean normalized velocity of particles was significantly affected by particle Froude number and a dimensionless viscosity. Within the range of this study, particle concn. effects were significant only with respect to standard deviations of distributions. Generalized Reynolds number poorly correlated with mean normalized particle velocity. A mathematical model for particle action was in qualitative agreement with experimental results. AS

269

Lebowitz (SF) and Bhowmik (SR). **Effect of retortable pouch heat transfer coefficients of different thermal processing stages and pouch material.** *Journal of Food Science* 55(5); 1990; 1421-1424, 1434

Apparent heat transfer coeff. (h) were determined for the come-up, heating, and cooling cycles of thermal processing for retortable pouches heated by circulating hot water under overriding air pressure. Values for h were converged on by a computer-based optimization method that incorporated process data, a finite difference model, and optimization criteria. For retortable pouches thermally processed in circulating water under overriding air pressure, h values for the come-up, heating, and cooling cycles were found not significantly different (95% confidence). This indicates that in mathematical models a constant h value may be assumed for the three thermal processing stages. Also, there was no significant difference between h values for aluminum foil/plastic laminate pouches and all-plastic pouches during the combined come-up and heating stages. Thus, the same h value for a given process is applicable to either pouch type. AS

270

McGuire (J) and Sproull (RD). **Temperature effects on food contact surface properties.** *Journal of Food Science* 55(4); 1990; 1199-1200

Measurable contact surface properties related to surface energy have been sugested to provide direction for prediction and control of fluid food behavior at interfaces. With respect to fouling of heat exchangers, such properties may be useful for development of mathematical models which incorporate surface-related terms. Surface energy parameters for a variety of contact surfaces were recorded at temp. from 7 to 80 C. A linear dependence was observed between surface energy properties and temp. This suggests a need to account for temp. influences on surface energy in further development of models which describe surface interactions undergone by food components at temp. outside of the ambient range. AS

271

Pham (QT). **Lethality calculations for thermal processes with different heating and cooling rates.** *International Journal of Food Science and Technology* 25(2); 1990; 148-156

In many thermal processes, the time constants f_h and f_c for the heating and cooling periods differ. This can cause difficulties in calculating the process lethality. This paper presents a simple method for taking into account this change in the time constant. The author's formula method is tested against simulated data from finite-difference computations, both for $f_h = f_c$ and for f_h & f_c, and found to be atleast as accurate as the best previous formula method. AS

272

Pham (QT) and Willix (J). **Effect of biot number and freezing rate on accuracy of some food freezing time prediction methods.** *Journal of Food Science* 55(5); 1990; 1429-1434

Existing food freezing time prediction methods yield widely differing results at high Biot numbers (internal resistance controlling), a situation that could not be previously resolved due to lack of data. Freezing tests were carried out on slabs of Tylose gel in a plate freezer to obtain more data, which alone and in combination with previous data, were used to test the methods of Cleland and Earle, Hung and Thompson, Pham, and finite differences. Good agreement was obtained with Pham's methods and with finite differences. Biot number, freezing rate and supercooling had negligible effect on the accuracy of these method. The accuracy of the finite difference method has been significantly improved by our new thermal property data for tylose gel. AS

ENERGY IN FOOD PROCESSING

273

Dunstan (B). **Microwaveability.** *Food* 11(10); 1989; 23-27

274

Niola (I). **Microwave heating of foodstuffs. Part 1. General characteristics, economic and health aspects.** *Industrie Alimentari* 29(280); 1990; 225-230 (It).

275

Parkes (L). **It's hot technology.** *Food* 11(5); 1989; 39, 41, 43

This paper explains how to keep the cost of one particular form of energy down. BV

FOOD CHEMISTRY AND ANALYSIS

Chemistry

276

Firedman (M) and Dao (L). **Effect of autoclaving and conventional and microwave baking on the ergot alkaloid and chlorogenic acid contents of morning glory (*Ipomoea tricolor Cav. cv.*) heavenly blue seeds.** *Journal of Agricultural and Food Chemistry* 38(3); 1990; 805-808

Ipomeoea tricolor Cav. cv. (Heavenly Blue morning glory) seeds contain about 20% high-quality protein, about 16% fat, and 55.5% carbohydrate and inhibited the activity of trypsin to the extent of about 11 mg/g of seed flour. The total ergot alkaloid content of 52 mg/100 g of the seeds was reduced by 8-21% when the seed flour was mixed with a commercial wheat flour preparation (Bisquick flour mix) in a ratio of 1:9 and baked as a muffin in a autoclave at 121 C for 18 min. Similar losses occurred when pure ergonovine was cobaked with the flour mix. Lysergol was more stable than ergonovine during baking. The corresponding decrease for the same preparation baked in a microwave oven for 90 sec was about 30%; after conventional baking at 204 C for 18 min, 23-31%. Losses in the crust were somewhat higher than in the crumb. Parallel studies on the decrease of chlorogenic acid showed that this compound is more labile than the alkaloids; it decreased about 100% in the crust fraction and 65% inthe crumb fraction of the convection-baked muffin. Microwave baking reduced the chlorogenic acid content by 77% of the original. These findings show that varying degrees of thermal destruction of ergot alkaloids and chlorogenic acid occur in a typical flour mix at ordinary baking temp. AS

277

Lai (H-M) and Schmidt (SJ). **Water mobility and crystallization action of lactose-water systems by oxygen-17 and carbon-13 NMR.** *Journal of Food Science* 55(5); 1990; 1435-1440

Systems ranging in concn. from 10-60g lactose/100g water were investigated by fully proton decoupled ^{17}O and fully proton decoupled ^{13}C Nuclear Magnetic Resonance (NMR). The relation between ^{17}O NMR transverse relaxation rate measurements and lactose concn. showed water mobility decreased linearly with increasing lactose concn. up to 25 g lactose/100 g water and decreased rapidly and nonlinearly above that level. Water mobility was used to monitor lactose crystallization in supersaturated solutions with time. The ^{13}C NMR showed no significant differences in chem. shifts of carbon atom peaks in lactose mol. during crystallization. However, depending on the method of sample preparation, mutarotation could be observed. AS

278

Leiras (MC), Alzamora (SM) and Chirife (J). **Water activity of galactose solutions.** *Journal of Food Science* 55(4); 1990; 1174, 1176

The water activities of galactose and mannose solutions were determined using an electric hygrometer The results followed the general behaviour reported for most types of nonelectrolytes and very well fit the Norrish equation. The water activity lowering effects of galactose were almost identical to those of mannose, glucose, fructose. AS

279

Monsalve (AG), Powers (JR) and Leung (HK). **Browning of dehydroascorbic acid and chlorogenic acid as a function of water activity.** *Journal of Food Science* 55(5); 1990; 1425-1428

Browning and degradation of dehydroascorbic acid (DHA) and chlorogenic acid (CA) at pH 6, was studied at variable water activities and temp. in a model food system containing cellulose, DHA and/or CA. Rate of DHA browning followed an apparent zero order reaction and was max. at intermediate water activities. Activation energies for browning ranged from 13-17 Kcal and were independent of water activity. Browning and degradation of CA was negligible at water activity below 0.6. CA loss in the DHA-CA mixture was apparently delayed by decomposition products of DHA and this was pronounced at high water activity. AS

280

Musaiger (AO), Al-Mohizea (IS), Al-Kanhal (MA) and Jaidah (JH). **Chemical and amino acid composition of four traditional foods consumed in the Arab Gulf states.** *Food Chemistry* 36(3); 1990; 181-189

The chemical and amino acid comp. of four traditional foods commonly consumed in the Arabian Gulf states were investigated. These foods are two kinds of fermented fish sauces (tareeh and mehiawah) and two types of bread made from date and cheese. The results indicated that tareeh had higher levels of protein, ash, Ca, Na, Mg, P and Zn than mehiawah, whereas the second fish sauce had higher amounts of moisture, fat, carbohydrates, Fe and K. For the breads, cheese bread (Khubez-jebin) had higher levels of protein, fat, ash, Ca, P and Na than date bread (Khubez-tamer). However, the breads made from dates were higher in most mineral (Fe, K, Mg, Cu and Zn) than cheese bread. The amino acid profiles in both fermented fish sauces were superior to those of date or cheese breads. It was concluded that these traditional foods can provide substantial amounts of nutrients to the normal daily diets of Arab Gulf inhabitants. Nevertheless, attention should be paid to the high Na levels in fermented fish sauces. AS

281

Toldra (F). **Effect of glucose and maltose on the lowry proteins assay.** *Die Nahrung* 33(8); 1989; 795-796

282

Trifiro (A), Belloli (S), Gherardi (S), Negri (O) and Bazzarini (R). **Formation of reducing substances during browning reactions.** *Industria Conserve* 64(3); 1989; 245-250

Conventional oxidation-reduction methods for determining sugars and ascorbic acid are affected by significant interferences which increase with increasing nonenzymatic browning of the products analyzed. On the basis of the results obtained by drastically heating model solutions containing glucose, fructose, ascorbic acid and glutamic acid, the formation of interfering substances was found to depend on the pH and concn. of the solutions and on heating time as well. The reaction between sugars and glutamic acid was identified as responsible for the occurrence of substances interfering with the detn. of ascorbic acid. A correlation was found between these substance and nonenzymatic browning. AS

283

Voilley (A), Charbit (G) and Gobert (F). **Recovery and separation of 1-octen-3-ol from aqueous solutions by pervaporation through silicon membrane.** *Journal of Food Science* 55(5); 1990; 1395-1402

The membrane selected was made of silicon rubber, a dense material. This should yield good selectivity but rather poor membrane permeability as compared to microporous materials. The experimental results showed good selectivity and rather good permeability. Based on the Yamane theory, developed for microporous membranes, a model was developed, taking into account the specificity of transfer within dense polymers. AS

284

Wedzicha (BL) and Zeb (A). **Catalysis of the reaction between sorbic acid and thiols by surfactants.** *International Journal of Food Science and Technology* 25(2); 1990; 168-179

Sorbic acid reacts slowly with simple thiols at 80 C. The reaction involves nucleophilic attack on the sorbic acid molecule by the thiolate anion. Second order rate constants for the reactions of mercaptoethanol, mercaptoacetic acid, cysteine and glutathione are, resp., 0.86, 0.68, 2.3 and 2.5 $M^{-1}h^{-1}$ at 80 C and independent of pH in the range pH 3.7-5.7. The effect of dodecyltrimethylammonium bromide (DoTAB), sodium dodecyl sulphate (SDS), lecithin, datem ester (diacetyltartaric acid ester of C_{18} monoglyceride) and Tween-80 on the initial rates of these reactions at pH 5.0 are reported. The greatest catalytic effect was shown by DoTAB, giving a max. enhancement of rate by a factor of 21.4 for the mercaptoethanol reaction and 4.6 for the glutathione reaction. SDS was much less effective. The nonionic surfactants all behaved as catalysts. The mechanism of the surfactant-catalysed reaction is discussed. Kinetically derived stoichiometries of binding of the solutes in question to DoTAB micelles depend on surfactant concn., and for the thiols used (mercaptoacetic acid, cysteine and glutathione) it is found that each thiol mol. is associated with at least 10 surfactant mol. making up the micelles for surfactant concn. greater than or equal to 50 mM. The implications of micellar catalysis to food additive-food component interactions are considered. AS

285

Yaylayan (VA) and Lachambre (S). **Pyrylium betaines as reactive intermediates in Maillard reaction.** *Journal of Food Science* 55(4); 1990; 1124-1126

Evidence that pyrylium betaines (1,3-dipoles) were one of the precursors of early maillard polymers was obtained by following the formation of brown polymers at 450 nm in the presence and absence of

nonbornene (a dipolarophile) in a model system consisting of glucose and glycine; the results indicated that trapping the pyrylium betaines with nonbornene by a 1,3-cycloaddition reaction, supressed the absorption at 450 nm. In addition, other model systems were studied consisting of glucose and each of arabinose, actealdehyde and glyceraldehyde in the presence of maleic anhydride (also in the presence of norbornene) to distinguish between 1,3-dipolar cycloaddition reactions and Diels-Alder type cyclizations. All the results indicated the possibility of pyrylium betaine formation in Maillard model systems. AS

Chemistry(Analytical)

286

Jackman (RL) and Yada (RY). **Ultraviolet absorption and fluorescence properties of whey-potato and whey-pea protein composites.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 252-259

Several whey-potato and whey-pea protein composites were prepared by wet-blending and their ultraviolet (UV) absorption and fluorescence properties were measured at pH 4 to 8. A significant (P 0.05) interaction between the effects of pH and the proportion of vegetable proteins combined with acid whey proteins was observed for all UV absorption variables. In general, however, a blue shift and reduction of intensity of both UV absorption and fluorescence emission spectra occurred as pH decreased and the proportion of vegetable protein increased. Extrinsic fluorescence of proteins, measured at pH 6 to 8, also decreased with increasing proportions of vegetable protein. Increased protein-protein interaction and/or changes in protein conformation are implicated as proportions of vegetable protein in composites increased, and as pH decreased to near the pI of parent source proteins. AS

287

Phillips (LG), German (JB), O'Neill (TE), Foegeding (EA), Harwalkar (VR), Kilara (A), Lewis (BA), Mangino (ME), Morr (CV), Regenstein (JM), Smith (DM) and Kinsella (JE). **Standaridized procedure for measuring foaming properties of three proteins. A collaborative study.** *Journal of Food Science* 55(5); 1990; 1441-1444, 1453

A collaborative study involving nine lab. was conducted over 4 yr. to evaluate a rapid, simple and reliable whipping method for measuring overrun and foam stability. Effectiveness of the method was assessed by measuring the characteristics of foams formed by 3 protein solutions (5%): sodium caseinate, milk protein isolate, and egg white protein; identifying and systematically eliminating sources of variability. Major sources of variability were protein dispersing technique, the mixer, and the care exercised by the operator during sampling and weighing. The method detected differences in foam stability between egg white, casein and milk protein isolate (pooled SD = 4.5) using different mixers. AS

288

Schmidt-lorenz (W), Bischofberger (T) and Cha (S-K). **A simple nutrient tolerance (NT) test for the characteristation of the different types of oligocarbotolerant and oligocarbophile water bacteria from non-carbonated mineral water.** *International Journal of Food Microbiology* 10(2); 1990; 157-176

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

289

Keating (P). **Novel immobilised enzymes.** *Food Chemistry* 42(1); 1990; 16-17

This paper describes a very simple enzyme immobilization method which uses inexpensive, non-toxic polysaccharides of complementary change to form tough beads suitable for large scale continuous reactors. BV

290

Wasserman (BP). **Evolution of enzyme technology. Progress and prospects.** *Food Technology* 44(4); 1990; 118-122

This article reviews some of the emerging tools of enzyme technology, which include protein engineering and three dimensional stracture detn., use of enzymes in organic solvents, and the generation of enzyme mimics and emzymes (antibodies possessing catalytic activities). Also addressed is the ongoing quest for new and improved enzymes, emphasizing in particular, enzymes that demonstrate superior thermostability. 58 references. SRA

Fermentation

291

Plaga (A), Stumpfel (J) and Fiedler (H-P). **Determination of carbohydrates in fermentation processes by high performance liquid chromatography.** *Applied Microbiology and Biotechnology* 32(1); 1989; 45-49

HPLC is a universal, fast, accurate and selective method for the quantification of carbohydrates during fermentation processes. HPLC is not affected by complex constituents of fermentation media, such as meat extract, soybean meal or distillers solubles. The detection limit of the different investigated carbohydrates by refractive index monitoring ranges between 20 and 40 mg/l using a cation-exchange resin and between 50 and 100 mg/l using amino- or diol-bonded phases. AS

Microorganisms

292

Watson-Craik (IA), Aidoo (KE) and Anderson (JG). **Development and evaluation of a medium for the monitoring of food borne moulds by capacitance changes.** *Food Microbiology* 7(2); 1990; 129-145

The quality of the capacitance curves induced by the growth of food-borne moulds on a yeast extract/glucose/ammonium sulphate medium was improved by the addition of potassium dihydrogen phosphate to the medium. Thus, capacitance curves in phosphate-supplemented medium showed more stable baselines and more distinct detection times, improvements which were attributed to the effects of added phosphate on the medium buffering capacity. Operational parameters (pH and temp.) were evaluated with the phosphate-supplemented medium prior to screening against a range of contaminated foods. The mould-induced capacitance changes were not adversely affected by ingredients in the foods tested (product interference). Bacterially induced capacitance changes which could interfere with mould detection were significantly reduced with antibiotic supplementation. Tests with selected food contaminants demonstrated that the correlations between initial mould spore number and detection time were significant but sp. specific. AS

Algae

293

Cobelas (MA) and Lechado (JZ). **Lipids in microalgae. A review. I. Biochemistry.** *Grasas y Aceites* 40(2); 1989; 118-145

A review on lipids in microalgae is covered. Algal taxonomy lipid comp. in microalgae, lipids as a taxonomic tool, lipids and cell ultrastructure, fatty acid metabolism, lipid synthesis, enzymes of lipid synthesis in microalgae, toxic effects on lipid metabolism and lipids and photosynthesis. 217 references. BV

Bacteria

294

Manninen (M), Wirtanen (G), Ahvenainen (R) and Mattila (T). **Automated turbidometry in assessing the bacterial content of food products inoculated with pathogens.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 20-24

Automated turbidometry was used to assess the bacterial contents of various food products (base material for soft ice-cream, vanilla sauce, chocolate sauce, meat balls with brown sauce and meat soup) inoculated with different levels of pathogenic bacteria (*Bacillus cereus, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa*) and preincubated for 0.5-5.5 days at 25.5 plus or minus 0.5 C. The bacterial counts determined by the conventional plate count technique were compared with the results (turbidometric parameters of bacterial growth) given by the Bioscreen analyser. The linear regression curves between the log cfu/g and the detection time of bacterial growth were determined for the different food products. Correlation coeff. of -0.59 to -0.99 were obtained between the conventional plate count technique and the turbidometric method. *B. cereus* in the range 10^3 - 10^4 cfu/g could be detected within 5 h and *E. coli* within 8 h, whereas *P. aeruginosa* and *S. aureus* in the same range could be detected within 12 h. AS

295

Rodrigues (UM) and Kroll (RG). **Microcolony epifluorescence microscopy for selective enumeration of injured bacteria in frozen and heat-treated foods.** *Applied and Environmental Microbiology* 55(4); 1989; 778-787

A rapid (6 h) method for selectively enumerating coliforms, pseudomonads, and staphylococci has been developed which involves counting microcolonies grown on the surface of polycarbonate membranes under selective conditions. The method was not directly applicable to foods containing injured bacteria due to the poor formation of or an inability to form microcolonies under selective conditions. However, the introduction of a 3- to 5h resuscitation step in tryptone soy broth allowed the method to give reliable estimates of these organisms in a var. of frozen and heat-processed foods. Under nonselective conditions i.e., for total counts, the microcolony method enabled a rapid count to be made of viable bacteria in heat-treated foods, but these results were also made more consistent by the introduction of a resuscitation step. This method makes results from these foods available far faster than conventional enumeration methods. AS

Bacillus cereus

296

Shinagawa (K). **Analytical method for *Bacillus cereus and other Bacillus sp.*** *International Journal of Food Microbiology* 10(2); 1990; 125-142

Bacillus cereus can give rise to two distinct forms of foodborne disease, the emetic and the diarrhoeal syndromes. The emetic syndrome is belived to be associated with an emetic toxin pre-formed in food. Cooked rice is the most common vehicle, and the symptoms are similar to those of *Staphylococcus aureus* intoxication. The diarrhoeal type is caused by an enterotoxin and the symptoms generally parallel to those of the *Clostridium perfringens* food poisoning. Th heat resistance of *B. cereus* spores and the non-fastidious nature of the organism facilitates its survival and/or growth in a wide var. of foods. This review describes analytical methods available for the isolation, identification, and enumeration of the organism, in addition to details about biological and immunological methods for toxin assay. Data are also presented concerning the incidence and epidemiology of *B. cereus* food posioning around the world, and especially in Japan. AS

Bifidobacterium

297

McKellar (RC) and Modler (HW). **Metabolism of fructo-oligosaccharides by *Bifidobacterium spp.*** *Applied Microbiology and Biotechnology* 31(5/6); 1989; 537-541

Bifidobacterium adolescentis ATCC 15703, *B. longum* ATCC 15707, and *B. thermophilum* ATCC 25525 were examined for the ability to grow with fructo-oligosaccharides (FOS) as carbohydrate sources. The three sp. produced cell-associated β-fructosidases (inulinases) capable of hydrolysing FOS. Max. activity was obtained with short-chain FOS with degress of polymerization (DP) of between three and five (neosugars). The *B. thermophilum* inulinase was induced by inulin, a long-chain FOS with DP = 35, while the enzymes from the other two strains were constitutive. Production of inulinase by all three strains was regulated by catabolite repression. Inulinase activity of the three *Bifidobacterium* spp. was similar when grown with 0.5% inulin as the carbohydrate sources; however, *B. thermophilum* grew much more rapidly. All three strains utilized crude Jerusalem artichoke flour (JAF) as a carbohydrate source, suggesting that JAF might have commercial application as a food or feed additive to stimulate bifidobacteria in the gut. AS

Brevibacterium linens

298

Hayashi (K), Cliffe (AJ) and Law (BA). **Purification and preliminary characterization of five serine proteinases produced by *Brevibacterium linens.*** *International Journal of Food Science and Technology* 25(2); 1990; 180-187

Five proteinases were purified from culture filtrate of *Brevibacterium linens* by a series of column chromatography and found to be homogeneous by polyacrylamide gel electrophoresis. All appear to be serine proteinases, being inactivated by phenylmethylsulphonyl fluoride and not by EDTA or p-chloromercuribenzoic acid. They were all active against casein in alkaline pH (pH optimum of 11.0) and specific activity was within the range 2.66-3.23 units mg^{-1} protein. Proteinases C, D and E were more stable in higher temp. and acidic pH than proteinases A and B. Mol. wt. estimated by gel filtration were 37000, 37000, 44000, 127000 and 325000 for proteinases, A, B, C, D and E resp. AS

Clostridium sporogenes

299

Okereke (A), Beelman (RB), Doores (S) and Walsh (R). **Elucidation of the mechanism of the acid-blanch and EDTA process inhibition of *Clostridium sporogenes PA 3679 spores.*** *Journal of Food Science* 55(4); 1990; 1137-1142

Acid-blanching followed by addition of ethylenediamine tetraacetic acid to the can brine had been shown to control germination of mesophilic spores following sub-lethal thermal processes. The mechanisn of this control was investigated using *C. sporogenes* PA 3679 spore in buffered solutions. Spore suspensions in buffered 0.05M citric acid solutions, pH 3.5 and 5.8, and Sorensons phosphate buffer, pH 7.0, were heat-activated at 80 C and then heated for 5 min at 121 C. The mechanism of inhibition appeared to involve destruction of the spore germination system by heat at reduced pH as a result of collapse of the cortex peptidoglycan layers, possible hydration of the core and contamination increase in the core volume. AS

Listeria monocytogenes

300

Golden (DA), Brackett (RE) and Beuchat (LR). **Efficacy of direct plating media for recovering *Listeria monocytogenes from foods.*** *International Journal of Food Microbiology* 10(2); 1990; 143-155

301

Hughey (VL), Wilger (PA) and Johnson (EA). **Antibacterial activity of hen egg white lysozyme against *Listeria monocytogenes Scott A in foods.*** *Applied and Environmental Microbiology* 55(3); 1989; 631-638

Salmonella

302

Wilson (SG), Chan (S), Deroo (M), Vera-Garcia (M), Johnson (A), Lane (D) and Halbert (DN). **Development of a colorimetric, second generation nucleic acid hybridization method for detection of *Salmonella* in foods and comparison with conventional culture procedure.** *Journal of Food Science* 55(5); 1990; 1394-1398

Staphylococcus aureus

303

Bergdoll (MS). **Analytical methods for *Staphylococcus aureus*.** *International Journal of Food Microbiology* 10(2); 1990; 91-100

Fungi

Aspergillus

304

Patel (UD), Govindarajan (P) and Dave (PJ). **Inactivation of aflatoxin B_1** by using the synergistic effect of hydrogen peroxide and gamma-radiation. *Applied and Environmental Microbiology* 55(2); 1989; 465-467

Inactivation of aflatoxin B_1 was studied by using gamma-radiation and hydrogen peroxide. A 100-krad dose of gamma-radiation was sufficient to inactivate 50 MUg of aflatoxin B_1 in the presence of 5% hydrogen peroxide, and 400 krad was required for total degradation of 100 MUg of aflatoxin in the same system. Degradation of aflatoxin B_1 was confirmed by high-pressure liquid chromatography and thin-layer chromatographic analysis. Ames microsomal mutagenicity test showed loss of aflatoxin activity. This method of detoxification also reduces the toxin levels effectively in artifically contaminated groundnuts. AS

Mushrooms

305

Okereke (A) and Beelman (RB). **Acid-blanching and EDTA effects on yield, quality and microbiological stability of canned mushrooms.** *Journal of Food Science* 55(5); 1990; 1327-1330

A new process involving acid-blanching and addition of ethylenediaminetetra acetic acid (EDTA) to canning brine (ABC process) was compared with the standard commercial method (SCM) for effects on yield, quality and microbiological stability of canned mushrooms. Yields were not significantly affected by the ABC process compared to the SCM, but the ABC process resulted in significant improvement in colour and texture of the canned products. Spoilage from natural mesophilic and thermophilic bacteria of cans receiving less than recommended thermal process was significantly reduced by the ABC compared to the SCM process. Comparison of the ABC process with the SCM (F_0 7.5 vs 15) in a commercial cannery confirmed the feasibility and potential of the ABC process at reduced F_0 to improve quality and increase microbial stability of canned mushrooms. AS

306

Okereke (A), Beelman (RB) and Doores (S). **Control of spoilage of canned mushrooms inoculated with *Clostridium sporogenes PA3679* spores by acid-blanching and EDTA.** *Journal of Food Science* 55(5); 1990; 1331-1333, 1337

A new process involving blanching in 0.05M citric acid and addition of 200 p.p.m. calcium nitrite, EDTA in the canning brine (ABC) was compared to the standard commercial method (SCM) for control of spoilage of canned mushrooms inoculated with *C. sporogenes* PA3679 spores. Fresh mushrooms were uniformly inoculated by vacuum hydration in spore suspensions. Compared to the SCM, the ABC process reduced the potential number of nonsterile units per million cans at $F_0$10 from 14.8 to 2.1 . At F_0 8 and 10, the ABC process reduced spoilage of the canned products from 100 to 68.1% and 89.3 to 28.7% resp., compared to the SCM. AS

Yeasts

307

Pampulha (ME) and Loureiro-Dias (MC). **Combined effect of acetic acid, pH and ethanol on intracellular pH of fermenting yeast.** *Applied Microbiology and Biotechnology* 31(5/6); 1989; 547-550

The internal pH of *Saccharomyces cerevisiae* IGC 3507 III (a respiratory-deficient mutant) was measured by the distribution of 14^C propionic acid, when the yeast was fermenting glucose at pH 3.5, 4.5 and 5.5 in the presence of several concn. of acetic acid and ethanol. Good correlation was obtained between fermentation rates and internal pH. For all external pH values tested, the internal pH was

7.0-7.2 in the absence of inhibitors. The addition of acetic acid and/or ethanol resulted in a decrease of fermentation rate together with a drop in internal pH. Internal pH did not depend on the concn. of total external acetic acid but only on the concn. of the undissociated form of the acid. Ethanol potentiated the effect of acetic acid both with respect to inhibition of fermentation and internal acidification. AS

Hygiene

Bacteria

Listeria

308

de Corral (F) and Buchanan (RL). **Evaluation of the API-ZYM system for identification of *Listeria*.** *Food Microbiology* 7(2); 1990; 99-106

The API-ZYM system (Analytab products) was evaluated for potential use for confirming the identity of *Listeria* isolates. A total of 68 *Listeria* strains from various sources were assayed using standard procedures. All isolates were positive for esterase (C4), esterase lipase (C8), phosphohydrolase (one exception), β-glucosidase, acid phosphatase and lipase (one exception). Negative responses were observed consistently for valine aminopeptidase, trypsin, α-galactosidase, β-galactosidase, β-glucuronidase, α-fucosidase and cystine aminopeptidase (one exception). Variable responses were noted for alkaline phosphatase, leucine aminopeptidase, chymotrypsin, α-glucosidase and N-acetyl glucosaminidase. Comparison of these results with those of other Gram positive sp. indicated that the API-ZYM system could be used for rapid confirmation of *Listeria* to the subgenus level. AS

BIOTECHNOLOGY

309

Carnegie (PR). **Biotechnology and the improvement of food quality.** *Food Chemistry* 42(1); 1990; 14-15

This article highlights the two areas in which modern biotechnology has impact. The development of new rapid analytical techniques for monitoring product quality and genetic engineering of plants or animals with the aim of producing improved products. SRA

310

Fioretti (A). **Glucose syrups-review, biotechnology progresses and new applications for glucose syrups.** *Industrie Alimentari* 28(273); 1989; 702-705 (It).

A review of the carbohydrates comp. of the various commercial starches by hydrolysis products are briefly surveyed. The significant properties concept of D.E. and conversion) are explained and typical analyses of syrups, produced by different methods of hydrolysis of starches (potato, corn or wheat), are presented. The functional properties and the typical applications of glucose syrups in several foods are discussed: sugar as food ingredient, particularly for technological reason, may be wholly or in part replaced by glucose syrup. At last the progress in new biotechnology processes, in order to create new glucose syrups and applications, are explained. AS

311

Meek (SD). **Opportunities and applications of biotechnology in the food industry.** *Food Australia* 42(1); 1990; 12-13

This article foucses on a range of biotechnoiogy applications to an agriculturally based economy, cheese production, algal cultivation, natural products extraction and waste treatment. SRA

312

Moresi (M) and Patete (M). **Mechanically agitated bioreactors. Review of the main design parameters.** *Industrie Alimentari* 29(280); 1990; 244-256, 262 (It).

In this work the main process design parameters of mechanically agitated bioreactors are reviewed in order to select, among the large number of empirical correlations reported in the literature, those allowing the most accurated prediction of ungassed (P_o) and gassed (P_G) power dissipation, as well as the volumetric oxygen transfer (k_La) and the inside and outside heat transfer (h_1,h_0) coeff. Furthermore , a few remarks on the mechanical design of the mixer shaft are reported. Finally, a typical industrial scale stirred bioreactor has been redesigned by assuming the same working vol., temp. and pressure on the tank top and overall oxygen transfer rate, in order to check the accuracy of the design procedure previously developed and the correlations here selected as a short-cut, study-grade design method for this class of bioreactors. AS

Single-cell proteins

313

Sukara (E) and Doelle (HW). **A one-step processes for the production of single-cell protein and amyloglucosidase.** *Applied Microbiology and Biotechnology* 30(2); 1989; 135-140

Indonesian food, tempeh. The newly isolated sp. was similar in its morphological characteristics to *Rhizopus oligosporus* UQM 145F, but grew faster on potato-dextrose agar as well as in submerged culture. The new isolate was found to convert ground cassava tuber directly into single cell protein without pretreatment due to its high amyloglucosidase formation. From 100 g ground tuber, a dry biomass of 33.75 g containing 26.48% true protein together with 60 ml of highly active amyloglucosidase (282 units) was obtained in 12 h. The amyloglucosidase was recovered by ultrafiltration, releasing 26.226 millimol glucose/l/min from soluble starch. The crude enzyme exhibited a pH optimum between 4.6 and 5.0, a temp. optimum between 55 and 60 C and an apparent Km of 3.125 g/l. High substrate concn. and ammonium sulphate are inhibitory to the enzyme. AS

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

314

Krumhar (KC) and Berry (JW). **Effect of antioxidant and conditions on solubility of irradiated food proteins in aqueous solutions.** *Journal of Food Science* 55(4); 1990; 1127-1132

Food proteins were examined after irradiation. Effects of exposure, headspace gas, buffer, pH, antioxidant, total protein and type, and storage were tested. Decreases in solubility of native protein and formation of high MW polymers were observed. Destruction was greatest at low protein concn., high radiation dose (10 kGy) and pH 7. High protein concn. (5-10%), glucose, pH 5-6 and propyl gallate were protective. Ascorbic acid effects were concn. independent. Nitrogen headspace effect was influenced by antioxidant and was smaller than expected. Propyl gallate plus glucose or SDS helped maintain protein solubility and size at high radiation rates. Marked declines in isoelectric pH consistent with lysine destruction were revealed. AS

Preservatives

Antimicrobials

Sodium lactate

315

de Wit (JC) and Rambouts (FM). **Antimicrobial activity of sodium lactate.** *Food Microbiology* 7(2); 1990; 113-120

Sodium lactate (5%) used in neutral culture media has an antimicrobial effect which rises above that what would be expected from its water activity lowering effect. This antimicrobial effect was found to exist towards various lactic acid bacteria, *Staphylococcus aureus*, and *Salmonella typhimurium*. It is particularly evident from increased lag phase, decreased growth yield, and somewhat less from decreased growth rate. Adverse growing conditions, such as suboptimum temp., increase its antimicrobial effect. *Escherichia coli* is an exception, as its growth rate is hardly affected by 5% sodium lactate, although its growth yield is lowered. The antimicrobial activity of sodium lactate evidently reflects how various microorganisms can cope with this compound. AS

Stabilizers

Gums

316

Neukom (H). **Galactomannans. Properties and applications.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 41-45

This review discusses the galactomannans-an important group of plant mucilages or plant gums, which occur as storage polysaccharides in the seeds of numerous plants, particularly the leguminosae. Aspects reviewed are chemistry of galactomannans/properties (solubility, viscosity and stability in solution and interaction with polysaccharides), modified galactomannans, comp. of commercial galactomannans, specifications; individual galactomannans (carob bean gum, guar gum and tara gum); toxicological and legal aspects and applications. 28 reference. BV

Sweeteners

Steviosides

317

Fuh (W-S) and Chiang (B-H). **Purification of steviosides by membrane and ion exchange processes.** *Journal of Food Science* 55(5); 1990; 1454-1457

An ultrafiltration (UF) process removed more than 96% of the pigments and recovered 45% of steviosides non-nutritive sweetener from an extract of leaves. UF retenate was further processed by diafiltration (DF), and the permeate was

concentrated by reverse osmosis (RO). The membrane processes (UF, DF, RO) achieved an overall steviosides recovery of more than 90% with product purity 46%. Final purification was conducted by two consecutive mixed bed ion exchange processes. Then ion exchangers improved purity of the final product to 90%. AS

CEREALS

318

Moore (D), Sanei (A), Hecke (EV) and Bouvier (JM). **Effect of ingredients on physical/structural properties of extrudates.** *Journal of Food Science* 55(5); 1990; 1383-1387, 1402

The influence of three ingredients (bran, sucrose, magnesium carbonate) commonly used in extrusion-cooking of wheat flour-type formulations was studied. Extrusion-cooking was carried out in a twinscrew co-rotating extruder. The effect of the ingredients were analyzed by determining extrusion parameters, physical properties (apparent density, modulus of deformability and breaking stress) and structural properties (computerized image analysis of the transverse cut of extrudate). An increase in apparent density occurred when concn. of any ingredient increased. Cell number per pixel area increased greatly while average cell size decreased as bran concn. increased from 0 to 16%. Average cell size increased as magnesium carbonate increased from 0 to 0.4%, but cell size decreased above 0.4%. AS

319

Rath (CR), Gras (PW), Wrigley (CW) and Walker (CE). **Evaluation of dough properties from two grams of flour using the mixograph principle.** *Cereal Foods World* 35(6); 1990; 572-574

A new small-scale mixer based on the highly successful mixograph principle has been developed and shows excellent correlations with the standard instruments. It incorporates many features designed to simplify operation and to provide a long and reliable period of operation. The combination of the direct-drive design with electronic recording facilitates automated interpretation, display, presentation, and filing of results, as well as easy access for reinterpretation as required. AS

320

Riebel (A), Seefeld (F) and Grobe (I). **Determination of residues of chloroorganic insecticides and polychlorinated biphenyls in cereals, animal feed and water.** *Die Nahrung* 33(8); 1989; 743-751 (De).

A semimicro method for the quantitative detn. of chloro-organic insecticides (COI) and polychlorinated biphenyls (PCB) in cereals, feed-pellets and water is presented. The extraction of the active compounds is carried out with n-hexane or dichloromethane. The extracts of cereals and pellets are purified by column chromatography with aluminium oxide. A silica gel column is used for the separation of the compounds into COI as well as PCB and hexachlorobenzene. The detn. of the active compounds is carried out by gas chromatography using an electron capture detector. Recoveries range between 70 and 108% except for β-endosulphon. AS

321

Sahay (KM). **Evaluation of a general purpose abrasive mill for pearling of coarse cereals and dehusking of pulses.** *International Journal of Food Science and Technology* 25(2); 1990; 220-225

A small-scale, low-cost single unit, general purpose mill for pearling and dehusking is described. The mill has integral milling and cleaning chambers and a 10-grinding wheel root driven by 3.7 KW motor. Its capacity is between 96-340 Kg h^{-1} depending upon the grain being handled, dehulling efficiency of 75%. The cost of processing various from Rs. 4.5 to 9.2/t of feed. This can be owened, operated, and manned by small-scale processors in rural and semi-urban areas. SRA

322

Shelke (K) and Walker (CE). **A water jacketed bowl for mixograph temperature control.** *Cereal Foods World* 35(6); 1990; 575-577

Flour-water mixograms were obtained for a hard red winter and a soft red winter wheat flour at dough temp. of 10, 20, 30, 40, 50 and 60 C obtained by using a water jacketed mixing bowl. At the end of mixing, dough temp. was taken with a fine point electronic thermometer. Mixograms were run in triplicate, read by two individuals and by the computer for curve height and time to peak, and then compared statistically. Mixogram curve height was affected inversely by dough temp. As dough temp. was increased from 10 to 50 C, mixogram time to peak also increased. At 60 C it appeared to decrease sharply, although a true peak was difficult to identify. A further series with the hard wheat flour was run at 20, 25 and 30 C (a range of temp. that could be experienced in non-air-conditioned lab. with seasonal change). As compared with results at 25 C increasing to 30 C decreased curve height 5% and increased time to peak by 15 sec, while decreasing 20 C caused a 6% increase in curve height and a 25 sec decrease in time to peak, thus demonstrating the importance of temp. control in mixograph studies. AS

Barley

Barley flour

323
Newman (RK), McGuire (CF) and Newman (CW). **Composition and muffin-baking characteristics of flours from four barley cultivars.** *Cereal Foods World* 35(6); 1990; 563-566

Flours from an isogenic series of four barley cvs. were compared with one another and with a bread flour from wheat in terms of total and soluble dietary fiber and β-glucan content and of proximate analysis, and of the colour, vol., texture, and sensory acceptance of muffins baked from each. There were wide differences in dietary fiber content among barley cvs. and between the flours from them and from wheat, but acceptable muffins could be made from each. AS

Rice

324
Lin (CF), Hsieh (TC-Y) and Hoff (BJ). **Identification and quantification of the "Popcorn" like aroma in Louisiana aromatic Della rice (*Oryza sativa, L.*).** *Journal of Food Science* 55(5); 1990; 1466-1467, 1469

The "popcorn" like aroma was identified as 2-acetyl-1-pyrroline. Cooked Della white rice contained almost 300 mg 2-acetyl-1-pyrroline per g (dry wt.) rice, while cooked Lemont white rice (nonaromatic cv) contained 4 ng per g (dry wt.). Della white rice contained almost four times more 2-acetyl-1-pyrroline as the av. (73 p.p.b.) in two batches of Jasmine white rice imported from Thailand and comparably analyzed. AS

Rye

Rye proteins

325
Ludwig (I) and Ludwig (E). **Studies on the extraction of rye proteins with surface-active compounds.** *Die Nahrung* 33(8); 1989; 761-765 (De).

Extraction of 60-90% of rye proteins from different flours is performed with salts of long-chain fatty acids. A mean part of this protein is precipitated at pH 3 in presence of 1 M sodium chloride. Following a lyophilisation the ether extraction removes most of fatty acid. The protein mixture is low in pentosane content has a good taste and excellent emulsifying properties at pH 3.5. AS

Wheat

326
Ranhotra (GS), Gelroth (JA), Astroth (K) and Posner (ES). **Distribution of total and soluble fiber in various millstreams of wheat.** *Journal of Food Science* 55(5); 1990; 1349-1351

Twenty-three mill flour streams, four final flours, germ, millfeed and three millfeed fraction from milling hard red wheat were analyzed for soluble fiber (SF) and insolube fiber (IF). The objective was to identify a fraction(s) that may be a good source of SF. Whole wheat flour and germ each contained about 10% total (IF + SF) fiber; they also matched closely in SF and IF. Excluding the red dog fraction, the bran fraction was highest in SF. SF represented about 5% of the total fiber in the bran. No flour stream was a particularly good source of SF. The sixth midlings stream and about one-fourth of the total fiber as SF. Other streams, as well as "straight" and "patent" flours, contained SF and IF in about equal amounts. Products with straight or patent flour would increase SF in the diet without a disproportionate increase in IF. AS

Wheat flour

327
Horvath-Almassy (K). **Investigation of the additivity of flour characteristics in two component wheat flour mixtures.** *Acta Alimentaria* 18(1); 1989; 19-30

Baking quality, pastry and protein properties of two-component wheat flour mixtures were tested in model exp. The four basic flour samples comprised a wide range, almost three orders of baking quality (Jubilejnaja 50, MV 8, Baranjka and GK (silla of the year 1986). It was established that some of the characteristics additioned in the course of mixing means a high correlation between the properties as measured or calculated on basis of comp. Properties studied were: water absorption capacity, valorigraph value, SDS sedimentation value. However, other properties (loaf vol., largest cross-section), important from the point of view of the final product, did not prove additive at all. Results corresponded highly with the experiences of BOLLING (1980). The exp. permit the conclusion that the rheological properties of the pastry or the gluten of individual flours highly affect the baking quality of the mixture obtained from them. The mixture of a flour producing short, firm texture and another containing softened gluten may give a loaf of optimal vol. although the quality of the two flours is far from

optimal. The results point to the importance of the rheological properties of wheat true to var. for the baking industry. The deliberate utilization of the combinative capacity of different flours may improve the economicalness of the milling and baking industries while simultaneously satisfying the requirements of the consumer. AS

328

Wang (SM), Bouvier (JM) and Gelus (M). **Rheological behaviour of wheat flour dough in twin-screw extrusion cooking.** *International Journal of Food Science and Technology* 25(2); 1990; 129-132

A capillary type viscometer was designed to measure the apparent viscosity of the cooked wheat flour dough on-line in a twin-screw extruder. The effects of mean residence time and specific energy were studied in the ranges 20-45 s and 300-800 kJ Kg^{-1}, resp. A viscosity model was developed which accounts for effects of wall shear rate, moisture content and specific energy. It was shown that the extent of the cooking reaction is largely determined by the specific energy applied. AS

MILLETS

Corn

329

Hsieh (F), Hu (L), Peng (IC) and Huff (HE). **Pretreating dent corn grits for puffing in a rice cake machine.** *Journal of Food Science* 55(5); 1990; 1345-1348, 1355

The best operational conditions for puffing dent corn grits with a rice cake machine were 14% grit moisture, 215 C and 9 sec. Salting and steaming, low pH soaking medium, larger corn grit sizes, 2% glycerine, and 2% corn oil tended to increase puffed vol. of the corn cakes. Smaller grit sizes, 3% alcohol and high pH soaking medium had negative effects on corn cake vol. Acid-modification of corn starch, 1% or 3% corn oil, and up to 10% sugar had no effect. AS

Corn meal

330

Barrett (AH) and Ross (EW). **Correlation of extrudate infusibility with bulk properties using image analysis.** *Journal of Food Science* 55(5); 1990; 1378-1382

Corn meal extrudates were produced using process conditions designed to obtain various product structures. Extrudates were infused with a particle-containing, high melting point lipid suspension, a process used to produce calorically dense components for military rations. Image analysis was used to estimate the degree of particle penetration into the extruded matrices and determine cell size distributions.

Pearl millets

331

Khetarpaul (N) and Chauhan (BM). **Effect of fermentation by pure cultures of yeasts and lactobacilli on the available carbohydrate content of pearl millet.** *Food Chemistry* 36(4); 1990; 287-293

Single as well as mixed culture fermentations of pearl millet with yeasts (*Saccharomyces cerevisiae* or *Saccharomyces diastaticus*) and lactobacilli (*Lactobacillus brevis* or *Lactobacillus fermentum* significantly increased the total soluble sugars, reducing and non-reducing sugar content, with a simultaneous decrease in the starch content, of pearl millet flour. *S. diastaticus* and/ or its combination with the lactobacilli hydrolysed the starch content to the max. and, therefore, resulted in higher concn. of total soluble, reducing and non-reducing sugars when compared to those of unfermented millet flour. AS

332

Khetarpaul (N) and Chauhan (BM). **Effects of germination and pure culture fermentation by yeasts and lactobacilli and phytic acid and polyphenol content of pearl millet.** *Journal of Food Science* 55(4); 1990; 1180, 1182

Germination of pearl millet at 30 C for 24 hr reduced phytic acid significantly (P 0.05) which, on fermentation with mixed pure cultures of *Saccharomyces diastaticus*, *Saccharomyces cerevisiae*, *Lactobacillus brevis*, and *Lactobacillus fermentum* at 30 C for 72 hr, was eliminated or reduced to negligible levels in fermented sprouts. Concn. of polyphenols did not change in germination. The fermentation of sprouts by combinations of *S. cerevisiae* with *L. brevis* and *L. cerevisiae* and *L. fermentum* did not change polyphenol whereas *S. diastaticus* with *L. brevis* (Sdlb) increased and *S. diastaticus* with *L. fermentum* combinations decreased the polyphenol in the sprouts. AS

Popcorn

333

Pordesimo (LO), Anatheswaran (RC), Fleischmann (AM), Lin (YE) and Hanna (MA). **Physical properties**

as indicators of popping characteristics of microwave popcorn. *Journal of Food Science* 55(5); 1990; 1352-1355

Nondestructive physical property measurements, such as kernel size, sphericity, sp. gr. and elastic deformation were evaluated as indicators of the popping characteristics of microwave popcorn. A greater expansion vol. was observed in var. having sphericity values greater than 0.70. Within a given var., larger kernel sizes resulted in a lower unpopped kernel ratio and the expansion vol. and flake size were higher for kernels with a higher specific gravity. The elastic deformation was found to have no correlation with microwave popping. AS

PULSES

Black beans

334

Rivera (JA), Hohlberg (AI), Aguilera (JM), Plhak (LC) and Stanley (DW). **Hard-to-cook defect in black beans-peroxidase characterization and effect of heat pretreatment and storage conditions of enzyme inactivation.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 270-275

Black beans (*Phaseolus vulgaris*) were studied in order to characterize the soluble peroxidase (POD) activity and to determine the effect of heat pretreatment and storage conditions on hardening and enzyme inactivation. Bean POD activity demonstrated a pH optimum from 6.4 to 6.8, an optimum temp. between 40 and 45 C, an activation energy of 1.19 kJ/mol, a strong dependence on water activity and little sensitivity to added Ca ions. Beans stored at 30 C/85% RH exhibited a 30-50% reduction in POD activity compared to samples kept at 15 C/35%RH but this may not reflect *in vitro* rates. Thermal inactivation of POD activity in bean flour was facilitated at increasing moisture levels. A heat pretreatment of beans at moisture contents not exceeding 13% failed to control hardening in beans subsequently stored at temp. of 27 C or above and moisture levels of 13%. While no POD activity was found at heat pretreatment equilibrium temp. above 102 C and none of the samples that had acceptable hardening values demonstrated POD activity, increasing equilibrium temp. above 105 C continued to reduce hardness. Thus, heating to only inactivated POD was not sufficient and higher temp. were required to inactivate the hardening mechanism. AS

Carobs

335

Cancellas (J), Pou (J) and Mulet (A). **Protein enrichment of carob kibbles after sugar extraction.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 73-77

Content of soluble polyphenolic compounds, pectic substance and sugars were studied in carob pods from Mallorca (Spain). Sugars were extracted in short time and at low temp. (30-40 C). The ratio sugars/polyphenols decreased at higher temp. (60-100 C). The extraction of soluble pectins proceeded quickly at the beginning of the operation and was not very sensitive to temp. As substrates for growing yeast on semi-solid culture, chopped carob pods and low sugar carob kibbles (LSCK) pretreated at 121 C, sulphuric acid 0.1 M during 20 min were used. The best yields were obtained on LSCK with *Trichosporon penicillatum* attaining 10% protein. Because of the higher protein content obtained with LSCK it would be more profitable to extract first the sugars and growing microorganisms on the residue. AS

Cowpeas

336

delta Gatta (C), Piergiovanni (AR) and Carnovale (NQNE). **Trypsin inhibitor levels in raw and cooked cowpea (*Vigna unguiculata*) seeds.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 78-80

Dry seeds of cowpea var. were analysed for protein and trypsin inhibitor (TI) contents. The TI level was found to vary considerably in the samples. The antitryptic activity in the raw state was appreciably reduced by cooking, thus improving the nutritive value and digestibility of seeds. The TI level in cowpea seems to have no correlation to bruchid resistance. BV

337

Demooy (BE) and Demooy (CJ). **Evaluation of cooking time and quality of seven diverse cowpea (*Vigna unguiculata (L.) Walp*).** *International Journal of Food Science and Technology* 25(2); 1990; 209-212

Seven newly harvested cowpea (*Vigna unguiculata* (L.) Walp) var., seeds of Botswana were kept in the open air for 2 wks, then stored at 4 C and 40% RH for 3 months. Duplicate samples were tested for cooking time with and with out 12 h prior to soaking. Although the overall effect of soaking was insignificant, var. showed differences (P 0.01) in cooking time and response to soaking. Cooking times ranged from 29 to 64 min without soaking and 36 to 56 min after soaking, with small-seed var. having the longer cooking times. Some var. showed

seed coat becoming soft and other remained tough or split before finally softening. SRA

Dry beans

338
Hentges (DL), Weaver (CM) and Nielsen (SS). **Reversibility of the hard-to-cook defect in dry beans (*Phaseolus vulgaris*) and cowpeas (*Vigna unguiculata*).** *Journal of Food Science* 55(5); 1990; 1474,1476

The hard-to-cook defect, assumed to be a permanent condition in legume seeds, can be reversed. Dry beans (*Phaseolus vulgaris*) and cowpeas (*Vigna unguiculata*) which had developed the hard-to-cook defect when stored at 29 C, 65% RH had progressively shorter cooking times after additional storage at 6.5 C, 71% RH . This would suggest that the mechanism(s) leading to development of the defect should be easily reversed. The ability to reverse the hard-to-cook defect in legume seeds would provide several economic and nutritional benefits. AS

Green beans

339
Abbas (J), Rouet-Mayer (M-A) and Philippon (J). **Compared kinetics of two ways of chlorophyll degradation in blanched or unblanched frozen green beans.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 68-72 (De)

Kinetics of pheophytinization and bleaching of chlorophylls were compared in frozen green beans, blanched or unblanched, at the following storage temp.; - 6, -10, -15, -20 and -25 C. First order reaction kinetics were observed in terms of storage temp. for the two ways of chlorophyll degradation both for blanched and unblanched samples. The Q_{10} values (ratios of deterioration rates at two temp. differing by 10 C) were 7.8 for blanched samples and only 2.8 for unblanched ones. The finding that the rate of chlorophyll degradation is faster in blanched than in unblanched green beans at -6 C, whereas the opposite is the case at -18 C, can be explained by different Q_{10} values. AS

Pinto beans

340
Abdul-Kadir (R), Bargman (TJ) and Rupnow (JH). **Effect of infrared heat processing on rehydration rate and cooking of *Phaseolus vulgaris* (var. Pinto).** *Journal of Food Science* 55(5); 1990; 1472-1473

Imbibition studies and cooking tests were conducted to evaluate the effect of infrared (IR)-heating on pinto beans (*Phaseolus vulgaris*) heated to 99 and 107 C. IR-heating improved rehydration rate and increased degree of swelling of pinto beans. Water absorption capacities and imbibition rates were higher for the 99 than 107 C samples. However, tests showed IR-heating significantly increased cooking time of pinto beans. AS

Snap beans

341
Van Buren (JP), Kean (WP), Gavitt (BK) and Sajjaanantakul (T). **Effects of salts and pH on heating related softening of snap beans.** *Journal of Food Science* 55(5); 1990; 1312-1314, 1330

The effects of salts and pH on softening during cooking were tested by modifying solutions in which pods were heated. Ca displacement was minimized by soaking heated pods in 0.2 M CaCl before measuring firmness. Softening was increased independently by the presence of salts and when pH was increased from 5.2 to 6.2. Cations decreased firmness in the order Li Na = K ammonia and Ca Mg. Anions decreased the firmness in the order sulphur tetroxide acetate Cl nitrate. Firmness differences persisted at long heating times. The results support the hypothesis that pectin $beta$-elimination was the principal softening reaction. AS

Yam beans

342
Apata (DF) and Ologhobo (AD). **Some aspects of the biochemistry and nutritive value of African yambean seed (*Sphenostylis stenocarpa*).** *Food Chemistry* 36(4); 1990; 271-280

The proximate and mineral comp., amino acid profile and the quality of the protein of three var. of African yam bean (*Sphenostylis stenocarpa*) seed. In the raw, autoclaved and cooked forms, were assessed. The average crude protein, crude fibre and ash values of the raw yam bean were 23.3, 4.9% and 3.9% resp. Mineral concn. on dry wt. basis were: 3.3-4.2 g Kg^{-1} for P; 0.70-0.80 g Kg^{-1} for Ca; 1.3-1.7 g Kg^{-1} for Mg; 9.7-12.0 g Kg^{-1} for K; 0.04-0.06 g Kg^{-1} for Na; 27.8-46.2 mg Kg^{-1} for Mn; 38.2-44.0 mg Kg^{-1} for Zn; 52.0-63.0 mg Kg^{-1} for Fe and 8.1-11.8 mg Kg^{-1} for Cu. The amino acid comp. of the protein indicated lysine, 7.38-8.09 g/16 g N; tryptophan, 1.21-1.26 g/16 g N and methionine + cystine, 3.08-3.45 g/16 g N to be above, or close to, the values recommended by FAO/WHO. Cooked yam bean seeds contained relatively lower amounts of the nutrient components determined. Significant

differences (P 0.05) between raw autoclaved and cooked seed were found for the protein quality indices. The findings are discussed in terms of the nutritional potential for this resource for man and livestock. AS

OILSEEDS AND NUTS

Rapeseeds

343

Shahidi (F), Naczk (M) and Myhara (RM). **Effect of processing on the soluble sugars of brassica seeds.** *Journal of Food Science* 55(5); 1990; 1470-1471

The effect was studied of solvent extraction with absolute or 95% methanol with or without 10% ammonia and hexane, of low mol. wt. carbohydrates from rapeseed, canola and mustard seed. Rapeseed of Midas and Hu You 9 (Chinese) var., canola (low glucosinolate, low erucic acid rapeseed) of Triton cvs and Domo mustard seed were studied. Soluble sugar of hexane-extracted meals was 6.17 to 7.56%. Sucrose and stachyose were major sugars, and raffinose was in smaller amounts. Extraction of rapeseed and mustard seed with ammonia (10% w/w) with absolute or 95% (v/v) methanol reduced soluble sugars by up to 82%; sucrose and raffinose were extracted more efficiently than stachyose. The total soluble flatulence causing sugars was lowered by up to 69%. AS

Rapeseed proteins

344

Tzeng (Y-M). Diosady (LL) and Rubin (LJ). **Production of canola protein materials by alkaline extraction, precipitation, and membrane processing.** *Journal of Food Science* 55(4); 1990; 1147-1151, 1156

A process designed for the characteristics of rapeseed and canola proteins was developed, consisting of extraction of oil-free meal at pH 10.5-12.5, isoelectric precipitation to recover proteins and ultrafiltration followed by diafiltration to conc. and purify the remaining acid-soluble proteins. These steps compliment one another to yield three products to with excellent protein recovery. Isoelectric and soluble protein isolates containing 87-104% protein (N x 6.25) and a meal residue were obtained from canola meal. All five types of fractions were free of glucosinolates. The two isolates were in phytate, light in colour, and bland in taste. The isolate yield depended on the starting meal. The process is simple and has good potential for commercial application. AS

Sesame seeds

345

Taha (FS), Helmy (HE), Fahmy (M) and Ali (M). **Nutritional evaluation of sesame seed protein products.** *Grasas y Aceites* 40(2); 1989; 109-113

Dehulled hexane-defatted sesame meal, sesame seed protein conc. low in phytate content, sesame seed protein isolate almost free of phytates and sesame meal supplemented with lysine were fed to chicks that had been depleted of their embryonic protein reserve, at 6% level. Food consumption, wt. gain and protein effeciency ratio revealed better performance of the protein isolate as compared to the corresponding meal. This might be attributed to the traces of phytic acid present in the isolate (0.65 mg phytate P/g isolate) compared to the meal which contains 14.5 mg phytate P/g meal. Although the sesame protein conc. has a low phytic acid content yet it showed very little improvement in the nutritional quality over the meal probably due to its poor amino acid pattern. The nutritive value of the meal was improved when supplemented with lysine. AS

Soybeans

346

Petres (J) and Czukor (B). **Investigation of the effects of extrusion cooking on antinutritional factors in soybeans employing response surface analysis. Part. 2. Effect of extrusion cooking on urease and hemagglutinin activity.** *Die Nahrung* 33(8); 1989; 729-736

A Brabender 20 DN lab. scale extruder was used to study the effect of processing parameters on urease and hemagglutinin activity in dehulled soybeans employing response surface analysis. Process variables examined were: temp. of die (150, 160 and 170 C), feed moisture content (12, 16 and 20%) and screw speed (80, 120 and 160 p.p.m.). Urease and hemagglutinin activities of extruded samples were measured. Mathematical models developed in this study found to be significant to predict both urease and hemagglutinin activities of soybeans extruded under the examined process parameters. AS

Soy products

347

Cheng (YJ), Thompson (LD) and Brittin (HC). **Sogurt, a yogurt-like soybean product. Development and properties.** *Journal of Food Science* 55(4); 1990; 1178-1179

Two sogurt products were prepared by fermenting a formulation containing soy milk, 0.15% calcium acetate, 0.5% gelatin, and lactose (0 or 2%) with *Lactobacillus casei* and *Streptococcus thermophilus*. Commercial plain yoghurt was used as a control. Sogurts were evaluated for aroma, taste, texture, titratable acidity, pH, and colour. Sogurts had beany and raisin aromas, more bitter and astringent tastes than yoghurt, and slightly sandy mouth-feel. Sogurts and yoghurt did not differ (P 0.05) in intensity of butter aroma. Sogurt with lactose did not differ (P 0.05) from yoghurt in acidity. Sogurts were yellower and firmer than yoghurt. AS

Soy proteins

348
Erkelens (J). **Dissociation of the soy proteins glycinin and conglycinin.** *Die Nahrung* 33(8); 1989; 789-792

TUBERS AND VEGETABLES

Onions

349
Wolters (TC), Langerak (DI), Curzio (OA) and Croci (CA). **Irradiation effect on onion keeping-quality after sea-shipment from Argentina to the Netherlands.** *Journal of Food Science* 55(4); 1990; 1181-1182

Onion losses occur due to sprouting and rot. Onion cultivar 'Valenciana' was irradiated with 60 Gy, shipped from Argentina to the Netherlands, and stored 6 months at 4 C. The rot in unirradiated samples increased after 4 months while rot in irradiated samples remained almost constant. Irradiation almost completely prevented sprouting. Storage losses were 50% for unirradiated and 20% for irradiated samples. Irradiated samples showed an improvement in general appearance. Irradiation reduced wt. loss and damaged bulbs were more susceptible to storage rot. AS

Carrots

350
Andersson (RE), Eriksson (CE), Ann-Christine Salomonsson (A) and Theander (O). **Lactic acid fermentation of fresh and stored carrot. Chemical, microbial and sensory evaluation of products.** *Lebensmittel-Wissenschaft und Technologie* 23(1); 1990; 34-40

Carrots (*Daucus carota*) from the same harvest were divided into two batches. The first batch was lactic acid-fermented immediately after harvest, while the second batch was stored for 6 months before fermentation. Both batches were subjected to spontaneous fermentation, relying on the lactic acid bacteria occuring naturally on the carrot, and to controlled fermentation, using a *Lactobacillus plantarum* starter culture. When unfermented carrot was stored for a period of 6 months the amounts of free glucose and fructose decreased, while the amount of sucrose increased. The lactic acid bacteria primarily utilized glucose, fructose and sucrose and produced mannitol. The total fibre content was about the same in fermented and raw carrot. The use of a starter culture resulted in a more rapid decrease in pH value and in more uniform products, compared with spontaneous fermentation. The condition of the raw material is more important for the sensory and microbial qualities of the products than whether a starter culture is used to control the fermentation or not. Thus fermented fresh carrot could be chill-stored for at least 6 months while fermented stored carrot was high in yeast content within 2 months, regardless of whether the fermentation was controlled or spontaneous. AS

Cassava

351
Moorthy (SN), Jos (JS), Nair (RB) and Sreekumari (MT). **Variability of β-carotene content in cassava germplasm.** *Food Chemistry* 36(3); 1990; 233-236

β-carotene content of 21 clones of cassava from exotic and indigenous collections found to be possessing yellow colour in the flesh, was determined. The values varied from 0.04 to 0.79 mg/100 g edible portion, the highest being recorded for CE-314, an exotic collection. Eight clones had values over 0.25 mg while the rest values 0.25 mg. Thus, considerable variation in β-carotene content has been found in cassava germplasm. AS

Gari

352
Vasconcelos (AT), Twiddy (DR), Westby (A) and Reilly (PJA). **Detoxification of cassava during gari preparation.** *International Journal of Food Science and Technology* 25(2); 1990; 198-203

The mechanism involved in cassava detoxification during fermentation is studied and investigates the effect of endogenous linamarase and LAB on the reduction of cyanide in cassava during the preparation of *Gari*, a fermented cassava product consumed in West African countries. The most important processing stages with regard to elimination of cyanide were the initial grating of the cassava and final roasting of the product. The break

down of linamarin was dependent primarily on the presence of endogenous linamarase and the lactic acid bacteria during the fermentation were not directly involved in its hydrolysis. SRA

Potatoes

353

Dodds (KL). **Combined effect of water activity and pH on inhibition of toxin production by *Clostridium botulinum* in cooked, vacuum-packed potatoes.** *Applied and Environmental Microbiology* 55(3); 1989; 656-660

The effects of water activity (0.955 to 0.970), pH (4.75 to 5.75) and storage time (up to 60 days) on toxin production by *Clostridium botulinum* in cooked, vacuum-packed potatoes were studied by using factorial design exp. and most-probable number methodology. Samples were inoculated with $10^{3,\ 104}$ or 10^{5} spores of a mixture of five type A and five proteolytic type B strains, incubated at 25 C, and analyzed for toxin production. Toxin was produced at pH levels of greater than or equal to 4.75 when the water activity was greater than or equal to 0.970, pH greater than or equal to 5.25 when the water activity was 0.965, and pH greater than or equal to 5.75 at an water activity of 0.960. No toxin was detected when the water activity was 0.955. The probability of toxigenesis was significantly affected (P 0.0001) by storage time, water activity, pH, and the interactions water activity. pH and water activity storage time. The response to a decrease in pH was linear, while the response to a decrease in water activity was curvilinear. Using multiple linear regression, equations were derived which could predict the length of time until toxin production and the probability of toxigenesis by a single spore under defined conditions. AS

354

Mondy (NI) and Koushik (SR). **Effect of packaging material on nitrate nitrogen content of irradiated potatoes.** *Journal of Food Science* 55(4); 1990; 1183-1184

The effect of packaging materials on nitrate nitrogen content of irradiated potatoes was investigated. Tubers were irradiated at 10, 30 and 100 Krads and stored for 12 wk at 5 C in paper or plastic bags. Nitrate nitrogen content was significantly (P 0.01) higher in tubers packaged in plastic as compared to those in paper bags. Irradiation significantly (P 0.01) increased nitrate nitrogen content between the lowest and highest levels of treatment in tubers stored in both paper and plastic bags. AS

355

Parkin (KL) and Schwobe (MA). **Effects of low temperature and modified atmosphere on sugar accumulation and chip colour in potatoes (*Solanum tuberosum*).** *Journal of Food Science* 55(5); 1990; 1341-1344

Storage of 'Norgold' and 'Russet Burbank' tubers at 3 C in air led to accumulation of sucrose and hexose and a decline in chip colour quality to unacceptable levels (Hunter L values less than 40) within 2 wk. Storage in modified atm. of 1000 p.p.m. ethylene in air and low oxygen delayed decline in colour by 6-8 wk compared with storage in air. Storage in 1000 p.p.m. ethylene apparently reduced rate of conversion of sucrose to hexose. The low oxygen atm. appeared to reduce extent of sucrose accumulation and rate of sucrose conversion to hexose during storage. AS

Potato starch

356

Leszkowiat (MJ), Yada (RY), Coffin (RH) and Stanley (DW). **Starch gelatinization in cold temperature sweetening resistant potatoes.** *Journal of Food Science* 55(5); 1990; 1338-1340, 1420

Differential scanning calorimetry was used to compare temp., enthalpies, and kinetic constants for starch gelatinization in tubers of *Solanum tuberosum* L. var. Norchip and a cold sweetening resistant selection, 'ND-860-2', in an attempt to correlate cold sweetening susceptibility with starch granule stability. For corresponding heating rates, 'ND-860-2' onset and peak temp. were higher (P greater than or equal to 0.05) while differences in enthalpies and activation energies were not (P 0.05) different. Activation energy for amorphous swelling was 281 kJ mol^{-1} higher, and the min. temp. to induce crystallite disruption was 3.5 C higher, for 'ND-860-2' granules. Results indicate greater stability in 'ND-860-2' granules and suggest stability contributes to cold sweetening resistance. AS

357

Nagai (T) and Yano (T). **Fractal structure of deformed potato starch and its sorption characteristics.** *Journal of Food Science* 55(5); 1990; 1334-1337

A deformation of microstructure was attempted on native potato starch and the change in the microstructure was analyzed from the fractal viewpoint. The surface area calculated from the monolayer mol. number was different depending on the mol. used (Ar, nitrogen, Kr, 1-propanol, and benzene), which showed the surface microstructure was a fractal with the dimension 2.1-2.4. The specific surface area measured using nitrogen and benzene was a function of the mean diameter of the

material particles, which also showed that the porous structure of the particle was a fractal with the dimension 2.2-3.0. On the other hand, the sorption isotherm of water vapour was independent of particle diameter. AS

Sweet potatoes

358
Diamante (LM) and Munro (PA). **Water desorption isotherms of two varieties of sweet potato.** *International Journal of Food Science and Technology* 25(2); 1990; 140-147

Water desorption isotherms were determined for New Zealand sweet potato at 25, 40 and 55 C, and for Philippines sweet potato at 28 C. The isotherms were sigmoid in shape and type II according to the BET classification. The data were fitted to eight two-parameter equations reported in the literature. The effect of water activity, and temp., on the equilibrium moisture content, M_e g water/100 g dry solids, was best described for New Zealand sweet potato by $M_e = 20.51\ T^{-0.240}(\text{water activity}/(1\text{-water activity}))^{0.39}$ for water activity = 0.06-0.81. AS

Vegetables

359
Cairati (L) and Garbagnati (G). **Extraction of essential oils, essences and other substances from vegetables.** *Industrie Alimentari* 28(273); 1989; 716-720 (It).

Broccoli

360
Barth (MM), Perry (AK), Schmidt (SJ) and Klein (BP). **Misting effects on ascorbic acid retention in broccoli during cabinet display.** *Journal of Food Science* 55(4); 1990; 1187-1188, 1191

Leafy vegetables

361
Mercadante (AZ) and Rodrigue (DB). **Carotenoid composition and vitamin A value of some native Brazilian green leafy vegetables.** *International Journal of Food Science and Technology* 25(2); 1990; 213-219

Five native Brazilian green leafy vegetables (*Amaranthus viridis*, *Lepidium pseudodidymum*, *Xanthosoma* spp., *Sonchus oleraceus* and *Portulaca oleracea*) all used as palatable but not commercially grown food vegetables, were analysed for their carotenoid and provitamin A content as a study of their potential value in reducing vitamin A difficiency. The ranges of total carotenoid contents of *Amaranthus viridis*, *Lepidium pseudodidymum*, *Xanthosoma* spp., *Souchus oleraceus* and *Portulaca oleracea* were 347-468, 237-280, 225-361, 149-334 and 71-109 MUg g^{-1} with luetein and β-carotene predominating. The mean β-carotene contents (MUg g^{-1}) and vitamin A values (retinol equivalents RE g^{-1}) were 110 and 18.4, 84.6 and 14.1, 67.3 and 11.2, 62.9 and 10.5, 29.8 and 4.99, resp. The leaves contained lutein plus violaxanthin (54-61%), β-carotene (24-34%), neoxanthin (10-14%) and zeaxanthin, traces and α-cryptoxanthin. The native leafy vegetables were rich in provitamin A than cultivated leafy vegetables analysed previously which justify their commercial production. SRA

Alfalfa

362
Lencioni (L), Pisanelli (AM), Baldi (E), Fiorentini (R) and Galoppini (C). **Sheep milk cheese made with the addition of alfalfa leaf protein concentrate. Acidity and texture during ripening.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 81-87

Amaranthus

Amaranthus flour

363
Paredes-Lopez (O), Barba De La Rosa (AP) and Carabez-Trejo (A). **Enzymatic production of high-protein amaranth flour and carbohydrate rich fraction.** *Journal of Food Science* 55(4); 1990; 1157-1161

The basic conditions of an enzymatic process to produce high-protein amaranth flour (HPAF) and carbohydrate rich fraction (CRF) from raw flour were determined. Commercial preparations of α-amylase and glucoamylase were used. Conditions for both enzymes were: 20% (w/v) slurries of gelatinized whole flour and 0.10% (v/w) enzyme; for amylase, pH 6.5, 70 C and 60 min. The yield of HPAF was 38-39%. HPAF from both enzymes had 26-28% protein, 10-16% fat and 40-52% starch. Protein digestibility (76%) and reactive lysine (6.6-7.1g/100g protein) of HPAF were comparable to raw flour. CRF had a 17-21 dextrose equivalent. AS

Tomatoes

364
Beltran-Edeza (LM) and Germandez-Sanchez (H). **Preservation of ripe tomatoes by lactic acid fermentation.** *Lebensmittel-Wissenschaft und -*

Technologie 22(2); 1989; 65-67

This study proposes a possible utilisation of small-sized ripe tomatoes, to obtain the combination of incubation temp. NaCl concn. giving the fastest acidification and under these conditions, to identify the microflora involved in the lactic fermentation. Tomatoes were packed in plastic jars, covered with brine and allowed to ferment spontaneously. The exp. were carried at different temp. and NaCl concn., and the optimum was determined to be 40 C. and 3.8% (w/w) NaCl. The lactic acid bacteria isolated from the fermented product were *Leuconostoc mesenteroides*, *Lactobacillus brevis*, and *Streptococcus* sp. After fermentation, the product was packed in one liter glass jar and pasteurised by immersion in water at 77 C for 11 min. According to the results, the preservation of small-sized ripe tomatoes by lactic acid fermentation is technically feasible and similar to that of other vegetables though incubation conditions are different. SRA

365

Cantarelli (PR), Palma (ER) and Caruso (JGB). **Composition and amino acid profiles of tomato seeds from canning wastes.** *Acta Alimentaria* 18(1); 1989; 13-18

Tomato seeds from processing wastes and previously submitted to Hot and Cold Break treatments were demonstrated to be a potential source of nonconventional protein due to high lysine contents even though showing primary limitation for valine. The effect of such thermal treatments on the protein quality, chem. comp. and amino acid profiles was observed. Valine limitation; protein; fat; carbohydrates; fiber and ash contents were: 67 and 74: 33.71 and 36.77; 14.62 and 19.00; 4.76 and 5.35; 41.78 and 33.04; 2.01 and 2.14% for seeds from Hot and Cold Break treatments, resp. However, due to high fiber content tomato seed meals showed to be more suitable for isolation of protein concn. AS

Tomato pastes

366

Sadler (G), Davis (J) and Dezman (D). **Rapid extraction of lycopene and β-carotene from reconstituted tomato paste and pink grapefruit homogenates.** *Journal of Food Science* 55(5); 1990; 1460-1461

Samples were extracted in Erlenmeyer flasks with hexane-ethanol-acetone (50:25:25). After extraction, 15 mL of water were added to separate the solution into polar and nonpolar layers. Lycopene was concentrated in the upper nonpolar phase while other components and polar pigments were contained in the lower polar phase. The lycopene phase was analyzed using isocratic HPLC with a C-18 column and methanol THF-water (67:27:6) mobile phase. Lycopene and β-carotene eluted as chromatographically pure peaks. AS

Tomato puree

367

Drdak (M), Kusy (P) and Karovicova (J). **The suitability of the colour spaces for the evaluation of tomato puree colour.** *Die Nahrung* 33(8); 1989; 773-777

The paper discussed the assessment of suitability of the use of colour parameters in 6 colour systems (CIE 1931, CIE 1964, CIE 1976, UCS ANLAB, Hunter, FMC-2) for the classification of tomato puree products into qualitative groups. The statistical set contained 136 samples and 27 assessors (3672 evaluations) as well as their correlations between measured and calculated parameters of the colours. The suitability of use of individual colour parameters within the colour systems shown is discussed based upon results of correlation and regression analyses, and the utilization of the colour differences considered with respect to the detn. of the respective tolerances. In the CIE XYZ system a higher mutual dependence of the trichromatic components was found with the sensory evaluation results as compared to the HUNTER system (L, a_L, b_L). The "ideal colour" was determined in the tomato puree (X = 7.78, Y = 5.00, Z = 1.18). The results have shown clearly that the use of the absolute colour difference is feasible in the colour evaluation of foodstuffs. AS

FRUITS

368

Coas (V) and Delton (C). **Direct method to determine the ethylene-dibromide presence in fruits.** *Industrie Alimentari* 28(273); 1989; 700-701, 705 (It).

A peculiar heat treatment was carried out on fruit samples to liberate, together with the volatile compounds, the ethylene-dibromide eventually present. The amounts of this pollutant were determined gas chromatographically, without any previous manipulation of the samples. The sensitivity limit of the method was 20 p.p.b. AS

369

Maurer (J). **New technological process for fruit puree or pulpy concentrate.** *Industrie Alimentari* 28(273); 1989; 721-723, 728 (It).

370

Mutti (P) and Quintavalla (S). **Occurrence and stability of patulin in fruit products.** *Industria Conserve* 64(3); 1989; 251-254 (It).

A method for extracting and determining patulin in fruit nectars and juices with 90% recovery and good separation from 5-(hydroxymethyl)furfural was developed. Seventy-one sample of fruit products were then tested for patulin occurrence by this method and only 4% of them were found to be contaminated at levels from 35.5 to 89.3 MUg/l. Toxin stability in clear apple juice, apricot nectar and tropical-fruit nectar during storage at room temp., was also studied. The time required to reduce patulin content to undetectable levels ranged from 1 to 2 months in the tropical-fruit nectar and from 2 to 3 months in the two other products. Thermal destruction parameters (D_T and Z) for patulin in the above-mentioned products were estimated. Decimal reduction times proved very high and similar in all three products: D_{130} were 75, 72 and 67.6 min. in apple juice, tropical-fruit nectar and apricot nectar, resp. AS

Apples

371

Cilliers (JJL), Singleton (VL) and Lamuela-Raventos (RM). **Total polyphenols in apples and ciders. Correlation with chlorogenic acid.** *Journal of Food Science* 55(5); 1990; 1458-1459

The chlorogenic and caffeic acid combined in apple juice cvs and ciders correlated very well with total phenol content (P greater than or equal to 0.001; r = 0.989; n = 22). The same correlation was found when analyzed strictly by cv (P greater than or equal to 0.001; r = 0.986; n = 10). Analysis used automated Folin Ciocalteu (FC) colorimetry values for total phenols and reversed phase HPLC (280 nm detection) for chlorogenic and caffeic acid before and after fermentation. Concn. were between 8 and 1012 mg/L (as chlorogenic acid) in different cvs. The total chlorogenic acid by HPLC represented only 6.2 to 10.7% of the total polyphenol (calculated as chlorogenic acid) by FC in the apple cvs for all samples. Total peak areas correlated very well with total phenol content by FC (P greater than or equal to 0.001; r = 0.994; n = 22). AS

372

Karen King.. **Partial characterization of the *in-situ* activity of pectinesterase in Bramley apple.** *International Journal of Food Science and Technology* 25(2); 1990; 188-197

This paper describes some of the properties of pectinesterase (PE) in waste material (peel, cores and offcuts) obtained from apples stored in a cool, dry shed for 2, 4, and 12 wks. This waste would be similar in nature to the material used for apple juice production. A crude enzyme extract was prepared by suspending the dried and milled apple waste in 0.1 M NaCl at pH 8.5. The activity of PE under standard assay conditions of 0.5% apple pectin, 0.1 M NaCl pH 8.5 and 30 C was low, between 4 and 8 units g^{-1} dry matter, but activities up to 60 units g^{-1} dry matter were obtained at higher temp. The optimum temp. was 60 C with the enzyme stable up to 40 C with min heating. The mean activation energy for PE in the three samples was calculated at 39.2 kJ mol^{-1} K^{-1}. The optimum pH was high at 10.0 probably due to the PE assay measuring the extraction/solubilization and stability of the enzyme in addition to its activity, optimum activity was obtained in 0.15M NaCl with optimum stability at 0.5 M. SRA

Grapes

373

Winter (M), Velluz (A), Furrer (A) and Pickenhagen (W). **Identification of some sulphur-containing compounds in concord grape essence (*Vitis labrusca*).** *Lebensmittel-Wissenschaft und Technologie* 23(1); 1990; 94

In addition to the compounds already identified in Concord grape essence, trace amounts of three S-containing compounds were detected. 3-methylthiopropanal, ethyl 3-methylthiopropanoate and ethyl 2-mercaptopropanoate. Mass-spectra and retention indices were identical with the synthetic substances. AS

Mangoes

374

Aina (JO). **Physico-chemical changes in African mango (*Irvingia gabonensis*) during normal storage ripening.** *Food Chemistry* 36(3); 1990; 205-212

Some physical and chemical measurements were applied to mature green African mango fruits (*Irvingia gabonensis* Baill) during a 7-day storage ripening period at tropical ambient conditions (27-30 C and 68-70% RH). Changes in fruit wt., texture and colour reflected the most significant chem. changes in the fruit such as starch degradation, formation of sugars and increase in total carotenoids. The post-harvest ripening changes observed are discussed and compared with similar changes in other mango var. AS

375

Mitchell (GE), McLauchlan (RL), Beattie (TR), Banos (C) and Gillen (AA). **Effect of gamma irradiation on the carotene content of mangoes and red capsicums.** *Journal of Food Science* 55(4); 1990; 1185-1186

γ irradiation of red capsicums (cv. 'Five star') at 75 and 300 Gy had no significant effects on the carotene level of unstored red capsicums or red capsicums stored at 5 C for 3 wk. γ irradiation of mangoes (cv. 'Kensington pride') at 75, 300 and 600 Gy had no significant effects on the carotene content. Altering the conditions of irradiation (lower temp., nitrogen atm., lower dose rate) resulted in slightly higher carotene levels than those associated with irradiation under normal ambient conditions. AS

376

Pino (J), Rosado (A) and Sanchez (R). **Volatile components of three cultivars of mango from Cuba.** *Die Nahrung* 33(8); 1989; 709-715

Three cvs of mango from Cuba ('Corazon', 'Bizcochuelo' and 'Super Haden') were analyzed for their volatile aroma components. Ten new constituents were identified. Overall, the results for the cvs were similar, and all of them had monoterpene and sesquiterpene hydocarbons as their major group of volatiles (80% w/w of the total volatiles) and car-3-ene as their most abundant component. Comparison of these results with those previously reported for other cvs of mango shows wide variation especially with respect to Old World mango cvs. AS

Papayas

377

Godoy (HT), Rodriguez-Amaya (DB), Connor (AE) and Britton (G). **Confirmation of the structure of papaya-β-cryptoxanthin monoepoxide.** *Food Chemistry* 36(4); 1990; 281-286

β-cryptoxanthin monoepoxide has been widely found in food, but the position of the expoxy group has not been confirmed. In terms of nutrition, this confirmation is important because, depending on the location of the expoxy substituent, this carotenoid may or may not be a provitamin A. In papaya cvs Formosa it is present in amounts high enough to affect the vitamin A value substantially. Mass spectrometry and ^{1}H-NMR spectroscopy have unequivocally proved the structure to be 5,6-epoxy-5,6-dihydro-β, β-caroten-3-ol; thus, it is vitamin A active. AS

Peaches

378

Narain (N), Hsieh (TC-Y) and Johnson (CE). **Dynamic headspace concentration and gas chromatography of volatile flavour components in peach.** *Journal of Food Science* 55(5); 1990; 1303-1307

Dynamic headspace concn. was used to trap peach flavour volatiles from a promising cv. under development. Separation and identification of components were by high resolution gas chromatography and mass spectrometry. One hundred and ten compounds including alcohols, aldehydes, alkanes, esters, ketones, aromatic hydrocarbons, sulphur-containing compounds and some miscellaneous compounds were positively or tentatively identified. Forty-six compounds were positively identified in peach for the first time. AS

379

Robertson (JA), Horvat (RJ), Lyon (BG), Meredith (FI), Senter (SD) and Okie (WR). **Comparison of quality characteristics of selected yellow- and white-fleshed peach cultivars.** *Journal of Food Science* 55(5); 1990; 1308-1311

Physical, chem. and sensory characteristics and volatile constituents of five yellow and six white-fleshed peach cvs. were compared. The soluble solids/titratable acidity ratios were significantly higher and the Minolta "b" values were significantly lower for white-fleshed than for yellow-fleshed cvs. Shelf-life of white-fleshed fruit equalled that of yellow-fleshed fruit. Amounts of five compounds that contribute significantly to typical peach aroma were significantly higher in white-fleshed than in yellow-fleshed peaches. Generally, flesh colour showed little influence on hedonic scores, peach impact and sweet/sour balance. AS

Pears

380

Gherardi (S), Careri (M), Bolzoni (L), Aldini (R) and Trifiro (A). **Effect of ultrafiltration and reverse osmosis on the aroma composition of pear and peach purees.** *Industria Conserve* 64(3); 1989; 199-206 (It).

The aroma comp. of pear and peach purees concentrated by a combined ultrafiltration-reverse osmosis technique was studied. The concentrated products obtained showed analytical and sensory properties comparable to those of the initial purees. It was observed that during pear puree ultrafiltration high-mol. wt. esters remained

preferentially bound to the pulpy fraction. In the case of peach puree, only by liquid-liquid extraction was it possible to isolate and identify several lactones known as the main aroma components of this fruit. AS

381

Tomasicchio (M), Anreotti (R) and Bertini (S). **Study on pear dehydrofreezing.** *Industria Conserve* 64(3); 1989; 237-244 (It).

Exp. were conducted on two pear var. ('Abbe Fetel' and 'Kaiser') to find out the best dehydrofreezing technique for this fruit. The pears were peeled and cut in quarters which were then partially dehydrated in three different ways: by osmosis, with hot air after blanching, with hot air before blanching. The partially dehydrated quarters were finally frozen. The dehydrofrozen products obtained were compared with their frozen counterpart. The pears of both var. proved suitable for dehydrofreezing. The best dehydrofrozen products were obtained by the procedure in which partial dehydration was accomplished with air before blanching. Osmotic dehydration gave the least satisfactory results. AS

Pineapples

382

Fagade (DE) and Oso (BA). **Microflora associated with natural flora fermentation of pineapple (*Ananas comosus (L). Merr) for alcoholic beverage production.*** *Die Nahrung* 33(6); 1989; 509-515

Three rod shaped bacteria (*Bacillus subtilus, Lactobacillus delbruckii* and *Pseudomonas aeruginosa*) and two ascosporogenous yeasts (*Saccharomyces cerevisiae* and *Saccharomyces elegans*) were isolated from fermenting pineapple chips in sterile distilled water. The yeasts were associated with alcohol production while *L. delbruckii* contributed appreciably to the acidity of the beverages. The ethanol content rose from 1.2% at 24 h to 3.68% at 96 h. The total titratable acidity changed from 0.65 to 1.7% (acetic acid) within the period. The pH of medium fell from 3.85 within 48 h to 3.2 and remained almost constant till the end of fermentation. The fermentation product quality is discussed in relation to similar types of alcoholic beverages. AS

Pistacia lentiscus

383

Grant Wyllie (S), Brophy (J), Sarafis (V) and Hobbs (M). **Volatile components of the fruit of *Pistacia lentiscus.*** *Journal of Food Science* 55(5); 1990; 1325-1326

The volatile components from the fruit of the *Pistacia lentiscus* tree were analyzed by capillary gas chromatography (CGC) and CGC-mass spectrometry. The major components were the monoterpenes α-pinene, β-pinene, myrcene and limonene. Several sesquiterpenes, aliphatic esters, ketones, and phenolic compounds such as thymol and carvacrol were also identified. AS

Strawberries

384

Wesche-Ebeling (P) and Montgomery (MW). **Strawberry polyphenoloxidase. Purification and characterization.** *Journal of Food Science* 55(5); 1990: 1315-1319

Stable and highly active polyphenoloxidase (PPO) extracts were obtained using polyvinylpyrrolidone, Amberlite XAD-4, Triton X-100, and protease inhibitor in pH 5.25 buffer. Citrate and phosphate prevented binding of PPO to pectin. Phenyl sepharose chromatography resolved PPO into two isozymes (PPO-F1 and PPO-F2) both separated from pectin. PPO-F1 had a mol. wt. of 111,000, did not penetrate the running gel during electrophoresis, and was bound by concanavalin suggesting that it contained carbohydrate. PPO-F2 resolved into two peaks during DEAE-chromatography, had a mol. wt. of 34,500, and resolved into two bands during electrophoresis. AS

385

Wesche-Ebeling (P) and Montgomery (MW). **Strawberry polyphenoloxidase. Extraction and partial characterization.** *Journal of Food Science* 55(5); 1990; 1320-1324, 1351

Mixing strawberries ground under liquid N with polyvinylpyrrolidone alone or combined with Amberlite XAD-4 in pH 4.5 buffer yielded stable polyphenoloxidase (PPO) extracts. Temp. stability of the enzyme varied with substrate and followed first order kinetics of inactivation. pH optima were 5.5 with catchol and 4.5 with 4-methylcatechol. Max. activity was with D-catechin, followed by 4-methylcatechol and pyrogallol with no cresolase activity. Inhibition occurred with diethyldithiocarbamate, potassium metabisulphite, KCN and dithiothreitol. Benzensesulphonic acid, cystenine and ascorbic acid blocked the browning reaction without enzyme inhibition. Extraction with Dowex AG 2-X8 resulted in browning. No loss in activity after 95 days occurred with quick-frozen fruit stored under N at -40 C. AS

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Cocoa

386
Bertini (A). **Cocoa liqueur roasting.** *Industrie Alimentari* 28(273); 1989; 685-690 (It).

Starch

387
Faulks (RM) and Bailey (AL). **Digestion of cooked starches from different food sources by porcine α-amylase.** *Food Chemistry* 36(3); 1990; 191-203

The rate, limit and products of porcine α-amylase (EC .3.2.1.1) hydrolysis of cooked starches differ with starch source. The major controlling factors appear to be the amylose:amylopectin ratio and the gel age. The limit of hydrolysis of freshly prepared gels after 4 h treatment ranged from 70.5% for wrinkled pea (*Pisum sativum*) Cv. Scout to 92.2% for potato (*Solanum tuberosum*) starches. Ageing the gels before enzyme treatment reduced the limit of hydrolysis of the legume starches but not the cereal starches. The rate of hydrolysis of the α-amylase susceptible fraction of the starches was unaffected. The maltose:maltotriose ratio in the hydrolysis products for the cereals was 1:0.90 whereas that for the legumes ranged from 1:0.84 to 1:0.60. The differing ratios appear to be related to the amylose:amylopectin ratio. AS

388
Lee (YC) and Kim (KT). **Gelatinization and liquefaction of starch with heat stable α-amylase.** *Journal of Food Science* 55(5); 1990; 1365-1366, 1372

389
Marousis (SN) and Saravacos (GD). **Density and porosity in drying starch materials.** *Journal of Food Science* 55(5); 1990; 1367-1372

The particle density of granular and gelatinized corn starch was determined in the moisture range 0 to 1 kg water/kg dry solids, using a gas stereopycnometer. The bulk porosity (void fraction) of spherical starch samples at various moisture contents was estimated from the bulk and particle densities during air drying at 60 °C. The particle passing through a max. value of 1500 kg/m^3 at X = 0.15. The bulk porosity of the starch samples increased linearly during drying, reaching a value of 0.45 near dryness. Differences in structure between granular and gelatinized starches during drying were observed the stereomicroscopy. The changes in porosity could be related to variations of the effective moisture and thermal diffusivities of starch materials. AS

390
Rutschmann (MA) and Solms (J). **Formation of inclusion complexes of starch with different organic compounds. II. Study of ligand binding in binary model systems with decanal, 1-naphthol, monostearate and monopalmitate.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 70-79

391
Rutschmann (MA) and Solms (J). **Formation of inclusion complexes of starch with different organic compounds. III. Study of ligand binding in binary model systems with (-) limonene.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 80-83

392
Rutschmann (MA) and Solms (J). **Formation of inclusion complexes of starch with different organic compounds. V. Characterization of complexes with amperometric iodine, titration, as compared with direct quantitative analysis.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 88-93

The nature of starch inclusion compounds and the degree of complex formation between starch and suitable complexing agents were studied in binary systems of gelatinized potato starch and the selected inclusion compounds menthone, decanal, 1-naphthol and monostearate. The reaction was followed by a combination of amperometric iodine titration and quantitative analysis of the complex partners. Starch-monostearate complexes display a significant correlation between iodometric and direct analytical methods. In complexes of starch with decanal and menthone the correlation between both methods is restricted to limited concn. ranges. With 1-naphthol iodine can bind practically quantitatively to starch saturated with the ligand to form ternary inclusion complexes. A correlation between iodometric and quantitative methods can only be observed at a very low complexation level. Iodometric titration methods are only applicable for the analysis of starch inclusion complexes with organic compounds, when binding and structural characteristics of ternary complexes with iodine are known. AS

393
Rutschmann (MA) and Solms (J). **Formation of inclusion complexes of starch with different**

organic compounds. IV. Ligand binding and variability in helical conformations of V amylose complexes. *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 84-87

BAKERY PRODUCTS

394

Carroll (LE). **Stabiliser systems reduce texture problems in multicomponent foods and bakery products.** *Food Technology* 44(4); 1990; 94-98

395

Carroll (LE). **Functional properties and applications of stabilised rice bran in bakery products.** *Food Technology* 44(4); 1990; 74-76

396

Gras (PW), Hibberd (GE) and Walker (CE). **Electronic sensing and interpretation of dough properties using a 35 g mixograph.** *Cereal Foods World* 35(6); 1990; 568-571

This article describes the use of simple procedures and fitting of a simple mathematical function as a possible approach to automated interpretation of data obtained from a mixograph that has been modified to record electronically. PHR

397

Jeffries (T). **Improved baked goods.** *Food* 11(5); 1989; 45, 47

This paper explains the use of baking conc. to save time and money. BV

398

Sharma (N), Hanna (MA) and Friesen (BA). **Monitoring dough flow rate using computer.** *Cereal Foods World* 35(6); 1990; 550-552

The authors have developed computer controlled instrumentation to record mass of the extrudate Vs time. This instrument helps to record the data efficiently and correctly. The flow rate of the dough as recorded with this step agreed exactly with the theoretical flow rate. PHR

399

Smith (JP), Simpson (BK), Khanizadeh (S), Ooraikul (B) and Jackson (FP). **Control of fermentation problems in a gas packaged bakery product using a response surface methodology approach.** *Food Microbiology* 7(2); 1990; 147-161

English style crumpets of water activity 0.98 and pH 4.0 were packaged in a carbon dioxide:nitrogen (60:40) gas mixture, stored at 25 C and 30 C and monitored for changes in package vol. For packages stored at 25, C, package vol. decreased during the initial storage period. Subsequent in-package carbon dioxide production resulted in all packages having a blown appearance when a critical vol. of 1700 ml was reached after 16-20 days storage at 30 C and 25 C. resp. Effects of water activity, pH, storage temp., concn. of potassium sorbate, carbon dioxide ratio and inoculum level on the growth of, and carbon dioxide production by *Leuconostoc mesenteroides* the major spoilage isolate of gas packaged crumpets, were studied in agar and broth model systems using an experimental design termed Response Surface Methodology (RSM). The preliminary screening design indicated that water activity, pH and storage temp. were the most significant variables influencing growth of *L. mesenteroides* in an agar model system. Further study to evaluate the effects of the three variables on carbon dioxide production *L. mesenteroides* in a broth model system generated a second order polynomical equation which was used to predict levels of carbon dioxide production under various combinations of these variables. Based on this and previous studies, it was found that crumpets reformulated to water activity 0.965 -0.97 and pH 5.25 -7.25;and packaged in 60% carbon dioxide could be stored at ambient temp. for 25-30% days without visible mold growth, or carbon dioxide production and swelling of packages. This study demonstrated RSM as a powerful and useful research tool when several variables are to be studied simultaneoulsy. AS

Bread

400

Chaudhury (VK) and Weber (FE). **Barley bran flour evaluated as dietary fiber ingredient in wheat bread.** *Cereal Foods World* 35(6); 1990; 560-562

Barley bran flour (BBF), one of the newer cereal fiber sources, was compared for comp. and baking performance to other commercial fiber ingredients such as oat bran, corn bran, wheat bran, soy bran, cellulose, and whole wheat flour. Significant differences in both comp. and quality of bread were realized by 15% replacement of wheat flour by individual fiber ingredients. Baking characteristics of breads were obtained by subjective scoring by trained panelists and by sp. vol. measurement. BBF outperformed other fiber ingredients in producing a bread with substantially increased dietary fiber, highest loaf vol., and highest quality score of the fiber-enriched breads. BBF bread was scored the highest for flavour. Water absorption and mixing requirements for experimental doughs containing each fiber were obtained using the mixograph. The

bread formulation and method of baking used was the one commonly known as the Kansas State Process. AS

Crackers

401

Yu (SY) and Tan (LK). **Acceptability of crackers ('Keropok') with fish protein hydrolysate.** *International Journal of Food Science and Technology* 25(2); 1990; 204-208

This paper describes the hydrolysis of proteins from a freshwater fish (*Oreochromis mossambicus* using the enzyme alkalase (0.61) and the use of the hydrolysate in crackers. The hydrolysis was carried out at 50 C, using a ratio of one part later and one part fish mince, an enzyme:substrate ratio or 1.50 at pH 8.0. By heating to 90 C for 20 min. the reaction was terminated. After neutralisation, the soluble fraction obtained after centrifugation was spray dried in a mini spray-drier at an air inlet temp. of 170 C. with feed rate 41^{-1}. The spray dried hydrolysates was incorporated into dried crackers which are fried before eating. Ten per cent hydrolysate gave max. linear expansion. Sensory evaluation showed that in terms of appearance, crispness and colour, crackers with hydrolysate had highest scores compared to crackers made with *O. mossambicus* and *Sciaena* sp. (Jewfish). There was no significant differences in overall acceptability in all three samples. Crackers with hydrolysate had highest nitrogen content. SRA

Pasta

402

Cubadda (R). **Development of new technologies for the utilization in developing countries, of flours obtained from local raw materials.** *Industrie Alimentari* 28(273); 1990; 681-684, 690 (It).

Employing new technologies, cassava, sorghum, millet and maize flours can be utilized in high proportions in the preparation of pasta and extruded-cooked products of good or acceptable organoleptic and nutritional characteristics. BV

403

Shehata (NA), Ibrahim (AA) and Ghali (NN). **Effect of protein quality of supplementing wheat flour with soy protein concentrate in making Egyptian pastries.** *Die Nahrung* 33(8); 1989; 753-759

Soy protein conc. was used to enrich wheat flour in making Egyptian pastries. These pastries were made from different combinations of soy protein conc. wheat flour (0%, 2%, 4%, 6% and 8%). These pastries were scored for lightness, external appearance, internal appearance, flavour and aroma. Protein quality of the pastries was measured by a rat-growth study. There were significant differences in the organoleptic scores for all the factors studied for salty sticks and anise biscuits. In case of meat supplement crescents and Marry biscuits there were no significant differences. The mean scores for the characteristics showed that soy protein conc. is a favourable supplement especially at 6% level. Wt. gain with rats increase as the percentage of soy protein conc. increases. The highest wt. gain was for rats fed Marry biscuits with 6% soy protein conc. followed by rats fed meat supplement crescents with 6% and the least was for rats fed anise biscuits with 4%. In all cases supplementation with 6% led to the highest PER values. Commercial pastries led to low wt. gains and low PER values. Addition of 6% soy protein conc. gave the highest wt. gain and the highest PER values. AS

Spaghetti

404

Dexter (JE), Matsuo (RR) and Daniel (RW). **The influence of heat damage on durum wheat spaghetti quality.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 227-237

Samples of Wascana and Medora durum wheat were tempered and artifically dried at various temp. and RH conditions to impart a range of heat damage. A mixing procedure patterned after the mixograph method used by the Grain Res. Lab. to detect heat damage in hard red spring wheat effectively estimated heat damage in durum wheat. Moderately heat-damaged durum wheat samples micro-milled into semolina exhibited pronounced delays in mixing time and reduced max. consistency when mixed in the farinograph at 31.5% absorption. Durum wheat withstood moderate gluten heat damage without adverse effects on spaghetti cooking quality. Severely heat-damaged durum wheat extruded normally and gave spaghetti with acceptable appearance and strand strength, but spaghetti cooking quality was unsatisfactory. Commercially dried Canadian durum wheat samples submitted to the Grain Res. Lab. following the wet 1985 harvest exhibited little or no evidence of heat damage. AS

405

Watanabe (E) and Ciacco (CF). **Influence of processing and cooking on the retention of thiamine, riboflavin and niacin in spaghetti.** *Food Chemistry* 36(3); 1990; 223-231

The influence of several processing steps, conditions of preparation, and enrichment levels on the retentions of thiamin, riboflavin and niacin, and on the technological quality of spaghetti were studied. The best drying treatment and the most adequate enrichement level, in addition to the package type and the behaviour of the final product during 3 months' storage, were determined. The results revealed that the vitamin retention and the technological characteristics of spaghetti are independent of the vitamin levels used and that the greatest losses of vitamins occur during the cooking step of spaghetti. After 3 months storage in the dark, the cooked spaghetti prepared in these studies was a good sources of the vitamins thiamin, riboflavin and niacin. They were retained at 96%, 78% and 94%, resp. of the initial levels in the enriched wheat flour. AS

MILK AND DAIRY PRODUCTS

Milk

406

Decio (P). **Dairy plant realization for the "pecorino" production from frozen sheep milk.** *Industrie Alimentari* 28(273); 1989; 724-728 (It).

407

Gabor (E). **Rapid simultaneous protein and fat content determination in milk by spectrophotometry.** *Die Nahrung* 33(6); 1989; 549-555

A rapid method was elaborated for the simultaneous detn. of protein and fat content of milk. The components of diluted milk dissolve completely in a mixture of formic acid (98 v/v%) and methylene chloride. This clear solution can be used directly for the spectrophotometric protein content detn. The protein show light absorption in the ultraviolet range. The fat content detn. bases on a special transformation. A turbidity will be appeared by adding formic acid (98 v/v%) to the above mentioned solution in a vol. ratio 4:1. It is proportional with the fat content of the solution and can be determined by measuring of its optical density. Calibration measurements are needed for the calculations of the protein and fat content of the examined sample. The accuracies of the methods are similar to the basic methods (KJELDAHL protein content detn. and ROSE-GOTTLIEB fat content detn.). AS

408

Ito (O), Kamata (S), Kaki-Ichi (N), Suzuki (Y), Hayashi (M) and Uchida (K). **Purification of milk catalase by immunoaffinity chromatography.** *Journal of Food Science* 55(4); 1990; 1172-1173

Antiserum against commercially available bovine liver catalase was prepared in rabbits. Anti-catalase antibody in serum was prepared following 30% ammonium sulphate treatment and Sephacryl S-300 column chromatography. The anti-catalase antibody was coupled to cyanogen bromide-activated Sepharose 4B, and using this immunoadsorbent crude milk catalase was purified. About 7.0 mg pure catalase was produced from 10 kg milk. Activity of the purified products was about 2.58×10^4 times as pure as cows' milk. The purified catalase was electrophoretically homogeneous, appearing as a single band. AS

409

Ng-Kwai-Hang (KF), Politis (I), Cue (RI) and Marziali (AS). **Correlations between coagulation properties of milk and cheese yielding capacity and cheese composition.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 291-294

On a monthly basis, approx. 4 L of milk were effected from each of 53 Holstein cows during the morning milking for one entire location. Subsamples of milk were analyzed by a formagraph for coagulating properties which were expressed as rennet clotting time, rate of firming and curd firmness. Cheese yielding capacity, gross comp. of resulting cheese, and losses of milk components in the whey were also determined. Partial correlation coeff. between coagulating properties and cheese yield, cheese comp. and milk components in whey were calculated. All three formagraphic parameters were correlated (P 0.01) with 37% moisture-adjusted yield with coeff. of -.23, -.29, and .29 resp. Cheese fat and protein, either when corrected or uncorrected for moisture content, were associated with rennet clotting time, rate of firming, and curd firmness. Faster rate coagulation and firmer curd were correlated (P 0.01) with a decrease in losses of milk fat, protein, and total solids in whey. AS

Milk products

410

Hashisaka (AE), Matches (JR), Batters (Y), Hungate (FP) and Dong (FM). **Effects of gamma irradiation at -78 C on microbial populations in dairy products.** *Journal of Food Science* 55(5); 1990; 1284-1289

The effect of low temp. (-78 C) gamma irradiation was investigated on microbial populations in selected dairy products to determine the irradiation dosage needed to produce commercially sterile dairy products for immunosuppressed patients. 40 kGy irradiation was sufficient to sterilize ice cream and

frozen yoghurt, but not Mozzarella or Cheddar cheeses. Up to 8 wk continued incubation of the 40 kGy irradiated products at 7 or 35 C resulted in no resuscitative growth in ice cream or yoghurt, but identifiable growth in the cheeses. The 12D for *B. cereus* preinoculated into cheese and ice cream was 43 - 50 kGy. AS

Cheese

411

Brummel (SE) and Lee (K). **Soluble hydrocolloids enable fat reduction in process cheese spreads.** *Journal of Food Science* 55(5); 1990; 1290-1292, 1307

Aqueous dispersions of soluble hydrocolloids replaced lipids in process cheese spreads. About 40% and 50% fat reduction was obtained relative to a control cheese spread containing 25% fat by increasing moisture to 62% and 68% resp., and eliminating a portion of fat from the formulation, xanthan, Lambda carrageenan, three types of high methoxyl pectin, propylene glycol alginate, low viscosity guar and Zooglan 115 gums were added to process cheese spreads at 0.18% to 4.1% wet basis. Spreads with 2.2% Lambda carrageenan, 1.7% to 2.2% pectin or 1.7% low viscosity guar had textures consistent with a high fat cheese control. Above these gum levels, cheese spread firmness (by Instron measure) increased while melt decreased. A 15% fat, 62% moisture cheese spread with 1.7% pectin was most like the control. In sensory studies it was less preferred than the control spread (25% fat, 48% moisture) due partially to less flavour. AS

412

Comi (G), Cantoni (C) and Valenti (M). **Evaluation of an enzymatic method for the rapid *Listeria spp.* detection in cheeses.** *Industrie Alimentari* 29(280); 1990; 231-236 (It).

The *Listeria*-Tck ELISA assay (Masbiotec, Milano) has been compared with a conventional cultural procedure (FIL/DF modified). The ELISA assay is able to detect *Listeria innocua, L. monocytogenes. Listeria murrayi*, and *Listeria welshimeri*, after 48 h in artifically contaminated cheeses. Non-specific reactions, none false positives or negatives were detected and the assay can be correlated to conventional methods. AS

413

Hegazi (FZ). **Some properties of white pickled cheese made with *Streptococcus faecalis subsp. liquefaciens* as a starter.** *Die Nahrung* 33(8); 1989; 721-728

Experimental batches of white pickled cheese made from a 1:1 mixture of raw cows and buffaloes milk containing 6.5% salt and 0.5% *Streptococcus faecalis* subsp. *liquefaciens* starter reached full maturity within 40 days at about 18 C. The cheese was good in quality and better than cheese made from either heated milk with starter or raw milk without (control). After 40 days, cheeses made from raw or heated milk with starter still contained $1.06\text{-}3.20 \times 10^8$ *S. faecalis* subsp. *liquefaciens*/g and 9.3 and 9.2% of their total protein (vs 8.8% for the control cheese) was soluble. The cheese also had higher amounts of tyrosine and tryptophan compared to the control. Electrophoretic analysis of cheese proteins did not show any marked difference in the electrophoretic patterns among cheeses. Using the proteolytic organism as a starter accelerated cheese ripening without any accompanying significant loss of fat, protein or wt. and improved the cheese flavour. The organism appears to act a safeguard against any probable enterotoxin production as well. AS

414

Morr (CV). **Effect of heating and elevated temperature storage on cheese-whey.** *Journal of Food Science* 55(4); 1990; 1177,1179

The effect of heating and storage of sweet (pH 6.1-6.3) and acid (pH 4.75) cheese-whey for up to 10 hr at 62.8 C (145 F)on pH, titratable acidity, total bacteria count and protein denaturation was investigated. Heating and elevated temp. storage reduced the total bacterial counts of both types of whey to less than or equal to $100\ mL^{-1}$ and stabilized their titratable acidity at 1.60-1.65%. These treatments resulted in up to 13.4% and 6.7% protein denaturation in sweet and acid whey, respectively, as measured by the pH 4.6 solubility method. SE-HPLC data confirmed that these elevated temp. treatments resulted in slight losses of major proteins. AS

Cheddar cheese

415

Buchowski (MS) and Miller (DD). **Calcium bioavailability from ripening Cheddar cheese.** *Journal of Food Science* 55(5); 1990; 1293-1295, 1364

Calcium bioavailability to rats was compared from CaCl (28mM), calcium carbonate, fresh milk, milk adjusted to pH 5.35, and Cheddar cheese. The cheese was manufactured from pasteurized bovine milk and all doses were labeled extrinsically with ^{45}Ca and ^{47}Ca and administered orally to rats. One label ^{45}Ca was added to milk before cheese manufacture and the other ^{47}Ca was added to the

cheese 24 h prior to dosing. ^{45}Ca bioavailability was determined by: 1) absorption measured by whole body counting, and 2) availability for bone metabolism assessed by bone radioactivity measurements. Ca absorption averaged 76.8% and was not affected by length of ripening (P 0.05). Absorption from CaCl, calcium carbonate, fresh milk, milk at pH 5.35, and the cheeses was similar. The two methods gave similar estimates of relative bioavailability. The ratio of ^{47}Ca absorption to ^{45}Ca absorption for any cheese sample was significantly greater than 1, indicating extrinsic labels added after processing may overestimate ^{47}Ca absorption from cheese. AS

Kefalotyri cheese

416

Karaioannoglou (PG). **Aflatoxin production on Kefalotyri cheese.** *Lebensmittel-Wissenschaft und-Technologie* 23(1); 1990; 4-6

The ability of *Aspergillus flavus* CMI 120920 to grow and produce aflatoxins on Kefalotyri cheese was studied. Chunks of the cheese were inoculated on the top surface with *Aspergillus flavus* CMI 120920 spores and stored at 5, 10, 13 and 26 C at 80% RH. No growth was observed at 5 or 10 C. At 13 C no growth was observed after 60 days in two trails. A very weak growth was observed after 52 days during a third trial, but no aflatoxins were recovered although the storage time was prolonged. At 26 C growth was abundant and the concn. of AFB_1 and AFG_1 in the top layer of the cheese (8 mm thick) ranged from 22-40 ng/g and from 33-64 ng/g, resp. No aflatoxins were recovered from the second 8 mm thick layer from the top. AS

Ice cream

417

Rico-Pena (DC) and Torres (JA). **Edible methylcellulose-based films as moisture impermeable barriers in sundae ice cream cones.** *Journal of Food Science* 55(5); 1990; 1468-1469

An edible bilayer film of methylcellulose and palmitic acid, 3:1 w/w, and a pure methylcellulose film were tested as moisture-impermeable barriers in a stimulated sundae ice cream cone. Circular pieces of film were arranged between the sugar cone and the chocolate layer of samples. Sugar cones of samples containing methylcellulose-palmitic acid films showed no detectable moisture increase for 10 wk at -23 C and for 4 wk at -12 C and only negligible increments after that. Moisture increase was greater in samples with pure methylcellulose films. Films retarded moisture transfer from ice cream to the sugar cone keeping its crispness longer than 3 months which is the commercial storage-life of the uncoated products. AS

Wheys

418

Jackman (RL) and Yada (RY). **Multivariate analysis of functional and structure-related properties of whey-vegetable protein composites.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 260-269

Several multivariate statistical techniques were applied to ultraviolet absorption, fluorescence emission and extrinsic fluorescence data to investigate the relationship between functionality and structure-related properties of whey-potato and whey-pea protein composites over the pH range of 4 to 8. Multiple regression analysis resulted in highly significant (P 0.001) equations predicting solubility, thermocoagulability, foaming capacity and emulsion properties. Cluster and principal component analyses delineated variables into three distinct groups reflecting solubility and/or surface-active properties, surface hydrophobicity and tryptophan exposure. Stepwise linear discriminant analysis led to correct differentiation of individual samples into their respective composites, based solely on significant (P 0.05) contributions to discriminant functions by variables characterizing surface hydrophobicity and solubility and/or surface-active properties. Results from this study support the hypothesis that hydrophobic residues play a key role in functional properties displayed by whey-vegetable protein composites. AS

419

Katsuta (K) and Kinsella (JE). **Effects of temperature on viscoelastic properties and activation energies of whey protein gels.** *Journal of Food Science* 55(5); 1990; 1296-1302

The creep behaviour of gels prepared with 10-15% whey protein was measured at 15-75 C. Gels prepared with 12-15% protein were thermorheologically simple, although their action was not totally consistent with Williams-Landel-Ferry (WLF) criteria. Gels made with less than 11% protein were more sensitive to temp. than those containing more than 11% protein and their thermal viscoelastic action was not consistent with polymer theory. The apparent activation energy (δ Ha) of the gel decreased with increasing temp. and noncovalent forces were important in maintaining gel structure. AS

420

Morr (CV) and Foegeding (EA). **Composition and functionality of commercial whey and milk**

protein concentrates and isolates. A status report. *Food Technology* 44(4); 1990; 100-112

Whey and milk protein products are surveyed to determine the dairy industrys progress in improving their quality. BV

Whey proteins

421
Phillips (LG), Schulman (W) and Kinsella (JE). **pH and heat treatment effects on foaming of whey protein isolate.** *Journal of Food Science* 55(4); 1990; 1116-1119

The overrun obtained by whipping whey protein (WPI) was significantly (p) affected by changing pH. Heating WPI at pH 4.0 reduced rate and amount of overrun. The highest overrun values for unheated WPI were observed at pH 5.0 and 7.0 after heating at 55 C for 10 min. The max foam stability for unheated WPI was obtained at pH 5.0. Heat treatment had little effect on stability at pH 4.0 and 7.0 but at pH 5.0, 80 C for 10 min improved stability by 65%. Based on surface pressure data, the rate of adsorption of β-lactoglobulin interfacial films and the work of compression correlated with overrun, max overrun, overrun development and foam stability

Milk proteins

Caseins

422
Britten (M) and Giroux (HJ). **Use of a flow cell apparatus to determine the emulsifying properties of casein.** *Journal of Food Science* 55(4); 1990; 1152-1156

A newly designed flow cell apparatus was used to investigate the effect of protein concn. and oil fraction on casein stabilized emulsions. Emulsifying capacity showed an exponential decrease with increasing casein concn. The microstructure of the emulsion suggested that insufficient surface coverage and mechanical stress on oil droplets' membranes were factors responsible for its collapse. Protein load and membrane thickness calculations, showed that the minimal surface coverage, or the minimal membrane thickness required to prevent emulsion collapse, increased with the oil fraction. This last relationship is suggested as a membrane resistance indicator for film forming proteins. AS

423
Le Meste (M), Colas (B), Simatos (D), Closs (B), Courthaudon (J-L) and Lorient (D). **Contribution of protein flexibility to the foaming properties of casein.** *Journal of Food Science* 55(5); 1990; 1445-1447

The effect of biopolymer flexibility on the foaming properties of casein was investigated. Flexibility was altered by: (1) chem. modification (covalent binding of a monosaccharide on the lysyl residues) or (2) pH change. Electron spin resonance was used to measure the reorientational frequency of casein residues labeled with nitroxide radicals. High levels of glycosylation induced increased protein flexibility and improved the foaming capacity. Good agreement was observed between higher values of flexibility and improved surface properties near the isoelectric point. AS

MEAT AND POULTRY

Meat

424
Barbut (S). **Effect of three chloride salts and chopping time on the microstructure and texture of meat batters.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 284-290

The effects of Na, K, and MgCl and chopping time (40 vs. 100 cutter revolutions) on the microstructure and textural properties of poultry meat batters were studied. Using 2.5% NaCl resulted in the most stable meat batter whereas using an equivalent ionic strength of MgCl produced the least stable batter as was evident by both scanning electron micrographs and the emulsion stability test. In the MgCl treatment numerous rupture holes in proteinaceous coat surrounding the fat globules were observed. 50% replacement of the MgCl with NaCl significantly improved the batter stability. Using KCl resulted in a batter as stable as the NaCl treatment at the short chopping setting but less stable at the long chopping setting. Average fat globule size decreased as chopping time increased in all the treatments but the KCl containing treatments. Increasing chopping time also showed a trend of increasing the products firmness. AS

425
Brule (D), Sarwar (G) and Savoie (L). **Effect of methods of cooking on free and total purine bases in meat and fish.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 248-251

Levels of free and total purine bases (adenine, guanine, hypoxanthine and xanthine) were determined in fresh and cooked (boiled and broiled) beef steak, beef liver and haddock fillets. Raw and

cooked beef liver contained the highest levels of free and total purine bases. Both methods of cooking produced an increase in the amount of free or total adenine and guanine in steak and liver and altered the levels of free hypoxanthine in steak. Little change observed in the levels of free and total purines in haddock. The differences in the levels of free hypoxanthine and xanthine in steak were associated with high levels of these bases in the cooking juices. Changes in the content of free and total purine bases in the meat products caused by cooking would suggest a modification in the uricogenicity of foods by processing. AS

426

Gordon (A) and Barbut (S). **Cold stage scanning electron microscopy study of meat batters.** *Journal of Food Science* 55(4); 1990; 1196-1198

Cryo scanning electron microscopy (Cryo SEM) was used to study the microstructure of raw and cooked meat batters and compared with conventional SEM and transmission electron microscopy (TEM). Cryo SEM revealed that raw batters consisted of an organized, highly interconnected protein matrix in which fat globules were dispersed. Cryo SEM resulted in much better preservation of protein gel structure compared to conventional SEM which caused shrinkage of the specimen, resulting in a closed gel matrix structure. TEM confirmed the differences between the matrices of raw and cooked batters shown by cryo SEM. Methods for preparation of specimen for cryo SEM were developed. AS

427

Lawrie (RA). **Meat quality. The significance of muscle differentiation.** *Food Australia* 42(2); 1990; 84-86

Consumer-portion meat tends to be derived from a single muscle. Since meat is postmortem muscle, it must be presumed that its eating quality will vary systematically with anatomical location. In the future, customers may be able to specify the tenderness, juiciness, colour and flavour which they individually desire. Economic interests will be safe guarded by analytical parameters. AS

428

Mattila (T) and Auvinen (M). **Headspace indicators monitoring the growth of *B. cereus* and *Cl. perfringens* in aseptically packed meat soup. Part 1.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 7-13

The growth characteristics of *B. cereus* and *Cl. perfringens* were followed in meat soup during the preincubation period at 30 C for 14 days. The microbes were UV-treated before inoculating into the meat soup. The control group was inoculated without UV-treatment. The food packs were sealed in plastic bags containing different headspace gas constituents (20% oxygen + 80% nitrogen or 100% nitrogen). The growth of *Bacillus* and clostridia were recorded every 2 days by cultivating and checking the headspace oxygen and carbon dioxide. The UV-treatment did not have a significant effect on the outcome of the growth of either *Bacillus* or Clostridia. *Bacillus* grew well in both nitrogen and air-flushed packages whereas Clostridia did not survive as well in air-flushed packs. The production of carbon dioxide was influenced by the initial headspace comp. The headspace comp. was also checked by powder-based redox indicators sealed in the packages. The colour changes measured through the package laminate by Minolta Chromameter correlated well with microbial growth in the food packs. AS

429

Teicher (H). **Application of phosphates in meats and seafood.** *Food Australia* 42(2); 1990; 88-91

This paper review the properties and functions of phosphates (phosphoric acid, sodium orthophosphates, sodium pyrophosphates and polyphosphates) used in meats and seafoods (surimi, canned fish, and prawn shelling). Emphasis is focused on the benefits resulting from increased water binding capacity, such as improved yields, flavour retention and texture. BV

Beef

430

Cantoni (C), Bersani (C) and Frigerio (R). **A new alteration of vacuum packaged beef meat.** *Industrie Alimentari* 28(273); 1989; 696-699 (It).

431

Jay (JM) and Hollingshed (AM). **Two methods for determining extract release volume (ERV) of fresh and spoiled beef and poultry meats.** *Journal of Food Science* 5595); 1990; 1475-1476

When the ERV of ground and diced beef that underwent microbial spoilage at 5 C was determined in the conventional way by use of Waring Blender and by use of Stomacher 400 (Tekmar Co., Cincinnati, OH), comparable values were obtained. However, for ground or diced chicken meat, Stomacher values were consistently higher than those when using the Blender. The basis for differences between the two methods for chicken meat is unclear. AS

Bovines

432
Areas (JAG) and Mota (EMA). **Effect of partial lipid removal with several organic solvents on conformation and solubility of protein from bovine lung.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 49-51

Mutton

Sheep

433
Prasad (VSS). **Meat yield from culled sheep and the quality of ready-to-eat mutton blocks.** *Indian Journal of Animal Science* 60(2); 1990; 249-250

Products

Meat

434
Barbuti (S), Ghisi (M) and Campanin (M). **Listeria in meat products. Isolation, incidence and growth characteristics.** *Industria Conserve* 64(3); 1989; 221-224 (It).

One hundred and twenty-five samples of raw meat products were investigated for *Listeria* sp. *L. monocytogenes* was found in five samples, while 18 others contained *L. innocua*. The growth of 11 *Listeria* strains in broth supplemented with different concn. of NaCl (from 0.5 to 16%) was evaluated at pH 6 and incubation temp. of 4, 18 and 25 C. All the strains proved NaCl-tolerant, being capable of growing in 10% NaCl at pH 6. AS

435
Mattila (T) and Auvinen (M). **Indication of the growth of *Cl. perfringens* in aseptically packed sausage and meat ball gravy by headspace indicators. Part II.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 14-19

Growth characteristics of *Cl. perfringens* were measured in sausage and meat ball gravy during the preincubation period at 30 C for 14 days. Clostridia were inoculated either directly into the gravy or the particle (meat ball, sausage). The food packs were sealed into plastic bags containing different headspace gas constituents (20% oxygen + 80% nitrogen or 100% nitrogen). The growth of Clostridia was checked every second day by cultivations and measuring the headspace oxygen and carbon dioxide. The headspace comp. was also determined by powder-based redox indicators. Clostridia did not grow in air-flushed sausage gravy or sausages whereas it grew well in both air and nitrogen-flushed meat ball gravy. There was no difference in the outcome of growth if Clostridia were inoculated into particles of meat are gravy. Both the redox indicators tested could detect the growth of Clostridia in air packages and in nitrogen packages. The colour parameters of the redox indicators selected for the detection are described. AS

Ham

436
Pedrielli (R), Pizza (A), Barbieri (G) and Fanceschini (M). **Production technology of cooked ham. Influence of the raw material and the addition of different amounts of brines containing caseinate and/or polyphosphate on the yield of the finished product.** *Industria Conserve* 64(3); 1989; 212-220 (It).

437
Pizza (A), Pedrielli (R), Barbieri (G) and Franceschini (M). **Effect of the use of brines containing caseinate and/or polyphosphates on the colour of cooked ham.** *Industria Conserve* 64(3); 1989; 207-211 (It).

438
Toldra (F), Flores (J) and Voyle (CA). **Study of the white film developed on the cut surface of vacuum-packed dry-cured ham slices.** *Journal of Food Science* 55(4); 1990; 1189-1191

439
Zubillaga (MP) and Maerker (G). **Determination of safrole and isosafrole in ham by HPLC with UV detection.** *Journal of Food Science* 55(4); 1990; 1194-1195

Poultry

Chickens

440
Bakalivanova (T) and Bliznakova (L). **Influence of frozen storage on the muscle lipids of deep frozen dietary convenience food from chicken.** *Die Nahrung* 33(6); 1989; 557-563

A study has been undertaken to investigated several characteristics parameters for the processes of oxidation and hydrolysis in the muscle lipids of 4 groups of dietary convenience food from chicken. The dynamics of the peroxide compounds and conjugated polyenes as well as the amount of malonic aldehyde was followed up in course of frozen

storage. On the one hand there was found peroxidation acceleration of NaCl and, on the other one, an antioxidizing effect of the citrate being contained in the dietary salt mixture. The study revealed that the activity of the lipolytic enzymes being responsible for the hydrolysis of the lipids was maintained even with the temp. of frozen storage. It was found that the haemoglobin pigments catalyze the oxidation processes. That is also the cause for the weaker oxidation stability of the leg meat compared to the breast meat. All the groups of boned chicken legs showed higher contents of oxidation products and malonaldehyde during the whole course of investigation. AS

441

Ibrahim (HM) and Shams (MHA). **Chemical composition and protein quality of chicken breast muscles.** *Grasas y Aceites* 40(2); 1989; 97-101

Raw and cooked chicken breast muscles were chemically evaluated for their protein, fat, ash, moisture and amino acids contents. The *in vitro* digestibility of these muscles was also determined. Essential amino acids index (EAAI), biological value (BV) as well as protein efficiency ratio (PER) were calculated to estimate the parameters related to the nutritional value of the breast muscles, and compared with those measured by rat bioassay. Chicken breast muscles proved to be of good protein quality being a low energy food. AS

442

Zabielski (J), Shieh (JJ) and Lakritz (L). **Effect of dose on gamma-irradiation induced formation of free radicals in freeze-dried natural actomyosin.** *Journal of Food Science* 55(5); 1990; 1462-1463

Freeze-dried preparations of actomyosin from chicken breast muscle were irradiated in liquid nitrogen with gamma-radiation from a cesium-137 source at 5, 10, 15, 20, 30, 40, and 50 kGy. The ESR spectra at -130 C were recorded with an EPR spectrometer. Signal intensities increased linearly with radiation. Analysis of data indicated a ten-fold rise in dose resulted in an almost seven-fold increase in number of free radicals generated. Determining the extent of such interaction on a major structural protein can help assess type and extent of reactions which might occur on irradiation of animal products. AS

Broilers

443

Rizzo (AM), Amorena (M) and Cortesi (ML). **Chloramphenicol and furazolidon residues in broiler livers of the market.** *Industrie Alimentari* 28(273); 1989; 710-712 (It).

Furazolidon and chloramphenicol residues were researched in n. 105 samples of broiler livers and in livers, kidneys and muscular tissue of n. 5 "ropped" (partially eviscerated) broilers and n. 1 hen, whose eggs were controlled too. The presence of furazolidon and chloramphenicol was demonstrated resp. in n. 35 (33.3%) and in n. 17 (16.1%) of the 105 broiler livers. Furazolidon residues were found also in the livers and kidneys of 3 ropped broilers and of the hen as well as in its eggs. AS

SEAFOODS

444

Kobelke (DN). **By-products from crustacean wastes. Chitin production.** *Food Chemistry* 42(1); 1990; 18-19

Covers production of chitin from crustacean wastes (chitin and chitosan, process technology and commercial plant). BV

Crabs

445

Ke (PJ), Smith-Lall (B), Helbig (N) and Yang (C-K). **Evaluation and improvement of the quality of fresh atlantic queen crab (*Chinoecetes opilio*).** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 41-44

Procedures and guidelines are described for evaluating the quality of queen crab (*Chinoecetes opilio*) meat samples. A 3-grade system is proposed consisting of a combination of chem. tests; free fatty acid (FFA) and extractable protein nitrogen (EPN) together with sensory evaluation. FFA levels were set at 42, 42-50 and 50 MUmol/10 g meat for grades A (good), B (acceptable) and F(unacceptable), resp. Similarly, EPN levels were set at 1.50, 1.00-1.50 and 1.00 mg N/100 g meat for grades A, B and F, resp. The rate of discolouration in queen crab meat varied with temp., initial quality of the crab meat and portion of the crab from which the meat sample was obtained. Queen crab meat remained acceptable when stored for 30 h at 3 C, 10 h at 13 C or 2 h at 23 C. AS

Shrimps

446

Taoukis (PS), Labuza (TP), Lillemo (JH) and Lin (SW). **Inhibition of shrimp melanosis (Black spot) by Ficin.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 52-54

Melanosis of pink shrimp (*Penaeus duorarum*) was significantly inhibited by treatment with dilute solutions of the sulphydryl protease ficin. The ficin was effective as a substitute for sulphites in preventing black spot formation under refrigerated storage of more than 1 wk. The mode of action of ficin is presumed to be inhibition of the polyphenol oxidase enzyme (PPO) responsible for the shrimp melanosis. AS

Fish

447

Kolakowski (E) and Wianecki (M). **Thermal denaturation and aggregation of proteins in minced fish as studied by a thermomechanical method.** *Journal of Food Science* 55(5); 1990; 1477-1478

A thermomechanical method of heating and mixing, was developed to study directly protein denaturation and aggregation in minced fish. It is based on simultaneous and continuous measurement of torque and temp. in a meat sample mixed while being heated. The torque and temp. were continuously recorded. From curves thus obtained, thermal denaturation temp. of minced samples from 6 marine fish sp. were determined. The curves showed 4-6 peaks at 32-38 C, 44-46 C, 52-56 C, and 62-75 C, presumably corresponding to denaturation of myosin, actomyosin, sarcoplasmic proteins, and actin resp. The temp. range of peak 1 was 4-5 C higher in fatty fish (herring, mackerel) than in lean fish (cod, blue whiting). AS

Anchovies

448

Veciana-Nogues (MT), Vidal-Carou (MC) and Marine-Font (A). **Histamine and tyramine during storage and spoilage of anchovie, *Engraulis encrasicholus*. Relationships with other fish spoilage indicators.** *Journal of Food Science* 55(4); 1990; 1192-1193, 1195

The formation of biogenic amines (histamine and tyramine) during *Engraulis encrasicholus* storage and spoilage was studied and compared with changes of other fish spoilage indicators: trimethylamine nitrogen, volatile basic nitrogen, hypoxanthine and pH. Good correlations were observed between biogenic amines and the other indicators, at both refrigeration (4-6 C) and room temp. (18-22 C). Two trails were carried out at each temp. Differences were observed in levels of biogenic amines as well as other indicators in exp. carried out under similar conditions. AS

Cubiceps natalensis

449

Lekshmy Nair (A), Stephen (J) and Gopakumar (K). **Nutritive value of edible meat and fish-meal from *Cubiceps natalensis*.** *Indian Journal of Animal Science* 60(2); 1990; 251-254

Edible meat and fish-meal prepared from *Cubiceps natalensis*, were analysed for dry matter, protein, fat and minerals. On an average 38.8% of the fish consisted of edible portions with 20.6% protein. Protein efficiency ratio values for raw muscle powder and fish-meal were 3.4 and 3.2 resp., compared to 3.0 for casein. The edible meat had a well balanced amino acid profile. Isoleucine and valine were the limiting amino acids of the meal, the chem. score being 88. AS

Hakes

450

Kairiyama (E), Lescano (G), Narvaiz (P) and Kaupert (N). **Studies on the quality of radurized and non-radurized fresh hake (*Merluccius merluccius hubbsi*) during refrigerated storage.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 45-48

Commercial high quality hake (*Merluccius merluccius hubbsi*), headless and tail-less, scaled and eviscerated was irradiated in a Cobalt-60 facility with a dose of 3.3 kGy at the temp. or melting ice. Control and irradiated samples were stored at 3 plus or minus 1 C. Results showed that the irradiation treatment was effective to keep the hake under hygienic conditions throughout the storage time (38 days) . It also caused a reduction of enterococci to very low levels. Regarding sensory evaluation, irradiated hake stayed within acceptable levels during the time period, in spite of having been rated lower than the control. AS

Mackerels

451

Parry (RWH) and Bainton (SJ). **Tyrosine-rich deposits on mackerel in sealed brine packs.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 95-96

Small white spots that had formed on brined mackerel during storage were examined and analysed. The main constituent of the spots was tyrosine, but other amino acids and cations were detected. The spots are unlikely to be harmful, and probably arise through excessive proteolysis during

processing, avoidance of which should prevent this defect. AS

Moza

452

Moharram (YG), Youssef (AMM) and Attia (RS). **Protein isolate from small pelagic moza (*Box boops*) fish.** *Die Nahrung* 33(8); 1989; 767-772

The factors affecting the protein extraction and isolation from small pelagic Moza (*Box boops*) fish were studied by three procedures. The results showed that the best conditions for extraction and isolation of the protein, were pH 9 for extraction, pH 5 for precipitation, 1:10 or 1:20 fish:extractant ratio and 22 C extracting temp. Generally the chem. comp., except ash and the functional properties of the three fish protein isolates, were nearly similar. AS

Scallop

453

Chung (SL) and Tan (HS). **Correlation between two variables each containing random error. Application of data on texture and muscle pH.** *Journal of Food Science* 55(5); 1990; 1479-1480

A new method is applied in detn. of correlation coeff. between two variables each containing random error. Using data on properties of scallop meat, the correlation coeff. estimated using the new method differed as much as 11% from those estimated using the conventional method. The conventional method is correct only when the number of replicates on all samples for all variables is equal. AS

Trouts

454

Baldrati (G), Ambroggi (F), Giavedoni (P), Gola (S), Sensidoni (A) and Cassara (A). **Modified-atmosphere storage of trout fillets. Optimization of the procedure.** *Industria Conserve* 64(3); 1989; 225-236 (It).

Exp. were conducted on the storage at 4 C of trout fillets pakcaged under various carbon dioxide-Nitrogen mixtures or 100% carbon dioxide as an alternative to conventional packaging under vacuum. The additional effect of a pre-packaging dip of the fillets in an aqueous solution of glucono-δ-lactone and lactic acid was also evaluated. Results showed that the modified atm. remarkably extended the shelf life of the fillets (up to 14 days with 100% carbon dioxide packaging) and that the acidifying dip, while not substantially changing their sensory characteristics, further prolonged their shelf life up to 24-26 days. It was also found that microbiological and sensory tests allowed the keeping quality of the product to be determined with sufficient reliability, while various chem. parameters taken as quality indexes poorly correlated with the results of these tests. Finally, to ascertain whether the treatments described might involve botulinum risks, trout fillets were experimentally inoculated with various *C. botulinum* strains (mixtures of spores and vegetative cells) and packaged under vacuum after acidification or under carbon dioxide with or without previous acidification. In none of the samples was growth or toxigenesis evidenced throughout the storage period. AS

Products

455

Shehata (NA), Ibrahim (AA) and Ghali (NN). **Effect of supplementing wheat flour with fish protein concentrate chemical and organoleptic evaluation.** *Die Nahrung* 33(6); 1989; 497-501

4 kinds of pastries were produced with addition of 0, 2, 4, 6 and 8% of fish-protein conc. to the wheat flour. These 4 pastries were scored for lightness, external appearance, internal appearance, flavour and aroma. The mean scores for these characteristics show that fish-protein conc. is a favourable supplement especially at 6% level. AS

Fish meals

456

Haaland (H) and Njaa (LR). **Methionine oxidation in commercially and experimentally produced fish meals.** *Food Chemistry* 36(4); 1990; 253-260

The amounts of methionine oxidized to methionine sulphoxide were determined in 36 fish meals produced in 1988 and in 86 fish meals produced in 1975. The 1988 meals were of three quality grades based on the freshness of the raw material. Total methionine (methionine plus methionine sulphoxide) and unoxidized methionine were slightly higher in the meals of the best quality than in the two other quality grades. The 1975 meals were dried either directly by flame or indirectly by steam. The raw material was unpreserved or preserved with a mixture of sodium nitrite and formalin, and the meals were either protected by addition of an antioxidant or unprotected. There were no significant effects of type of drier or of antioxidant protection on the degree of methionine oxidation whereas there was significantly less oxidized methionine in meals from preserved raw material. The various treatments showed little effect

on the content of total methionine. In model exp. with fish fillet meals, no obvious effect of oxidizing atm. and additions of unsaturated fat (cod liver oil) and trimethylamine oxide (TMAO) on methionine oxidation were found. During storage for 1-2 yr a slow oxidation of methionine took place. AS

Surimi

457
Kim (S-H), Huang (Y-W) and Carpenter (JA). **Effect of surimi addition to fresh pasta on ultra-structure and cooked firmness.** *Journal of Food Science* 55(5); 1990; 1481-1482, 1484

Transversal ultra-structure and firmness were examined on cooked spaghetti-shaped pasta prepared from durum semolina with 0% (control), 10%, 20%, and 30% Alaskan pollock surimi. The ultra-structure of the pasta exhibited two differences between inner and outer gross structure of the extruded product. In the inner portion, control and surimi-added pasta were not different. In the outer portion, surimi gel was observed as a network with small cavities uniformely distributed throughout the matrix formed by the gluten and/or gelatinized starch of durum semolina. Cooked firmness of the pasta decreased with addition of surimi. AS

PROTEIN FOODS

Infant foods

458
Champagne (ET), Hinojosa (O) and Clemetson (CAB). **Production of ascorbate free radicals in infant formulas and other media.** *Journal of Food Science* 55(4); 1990; 1133-1136

The effects of pH on ascorbate free radical production in ascorbic acid-supplemented cow's milk, soy- and milk-based infant formulas and in aqueous ascorbic acid solutions were observed. Formula and milk components decreased ascorbate free radical concn. Ascorbate free radical levels in pepsin-hydrolyzed soy and milk formulas were no different from those of unhydrolyzed formulas. At the phytate:iron molar ratio in the formulas, phytate decreased ascorbate free radical levels in pH 2.0 and 7.0 ascorbic acid solutions containing ion by 35% and 50%, resp. This antioxidant effect of phytate was not observed in soy-based and phytate-spiked milk-based formulas. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

459
Paterson (S) and Wale (R). **New development in membranes for beverage processing.** *Food Australia* 41(7); 1989; 852

Applications of memtec cross-flow microfiltration technology in the processing of wine, fruit juices, beer and water is described. BV

Alcoholic beverages

Beer

460
Ervin (V), Alli (I), Smith (JP) and Li (Z). **Extraction and precipitation of proteins from brewer's spent grain.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 216-221

Brewer's spent grain (BSG) a major by-product of the brewing process, was investigated as the starting material for the preparation of a protein conc. extraction of dried BSG with a solution of 3% sodium dodecyl sulphate -0.5% sodium phosphate (pH 7.0) for 1 h at 100 C resulted in the solubilization of 62.4% of BSG nitrogen. Addition of ethanol to the extract followed by refrigeration resulted in a protein conc. with a protein content of 61.1%, this represented a recovery of 49% of BSG protein. Amino acids analyses of protein conc. prepared by extraction of dried BSG and pressed BSG at 75 C and 100 C indicated that the amino acid comp. of the proteins was somewhat similar to that of barley, the parent material from which the spent grain were derived. Amino acid analysis and polyacrylamide disc gel electrophoresis indicated that there were distinct differences between protein conc. obtained by extraction at 100 C compared to those extracted at the lower temp. of 75 C. AS

461
Kaneda (H), Kano (Y), Kamimura (M), Osawa (T) and Kawakishi (S). **Evaluation of beer deterioration by chemiluminescence.** *Journal of Food Science* 55(5); 1990; 1361-1364

The application of chemiluminescence (CL) analysis for the evaluation of staling beer was studied. Commercial Japanese larger beer was stored at 30, 37 and 60 C and its CL generation was analyzed at 60 C. The CL production was accelerated to a greater degree and its intensity reached max. level more rapidly with increase in incubation temp. and/or time. The sum of the CL intensity for the first 1 h showed a good relationship with staling degree in mean flavour panel scores. Therefore, CL detn. may be useful for evaluating oxidation deterioration of beer. AS

462

Vidaud (Z), Gonzalez (E) and Garcia Roche (MO). **Some considerations about the tyramine content of some Cubean beers and wines.** *Die Nahrung* 33(8); 1989; 793-794

Wines

463

Pardo (I), Garcia (MJ), Zuniga (M) and Uruburu (F). **Dynamics of microbial populations during fermentation of wines from the utiel-requena region of Spain.** *Applied and Environmental Microbiology* 55(2); 1989; 539-541

The dynamics of fungi, yeasts, and lactic acid bacteria during fermentation of four musts were studied. Fungi disappeared quickly in the fermenting must. The lactic acid bacteria population diminished during alcoholic fermentation, then they increased and performed malolactic fermentation. Yeasts grew quickly, reaching max. populations at different times depending on the vinification treatment. AS

464

Tegmo-Larsson (I-M) and Spittler (TD). **Temperature and light effects on ethyl carbamate formation in wine during storage.** *Journal of Food Science* 55(4); 1990; 1166-1167

The formation and/or increase of ethyl carbamate during storage of wine was monitored at 43 C, 32 C and 22 C in the dark, at 22 C under fluorescent light and in a greenhouse with naturally fluctuating temp. and light conditions simulating commercial display of wines. The ethyl carbamate concn. of fifteen selected red and white table and dessert wines was determined initially, and after 3, 6, and 12 months storage. In most wines ethyl carbamate increased as a function of time and temp. After 12 months in the dark at 43 C, the ethyl carbamate in two red wines increased 20 to 30 times. It increased three to nine-fold in nine of the wines, but remained unchanged in four. Light did not significantly influence ethyl carbamate formation, whether in clear or green bottles. AS

Non-alcoholic beverages

Coffee

465

Nicoli (MC), Dalla Rosa (M) and Lerici (CR). **Chemical properties of coffee brew. 3rd Note. Kinetics of ageing and influence of some technological operations on the coffee brew stability.** *Industrie Alimentari* 28(273); 1989; 706-709, 712 (It).

It is well know that the main causes of deterioration of the organoleptic characteristics of coffee brew during storage are an increase in acidity and the formation of an precipitate. The ageing kinetics of a coffee beverage at different temp. of storage was evaluated. The influence of some technological operations, such as the use of inert atm., filtration and ultrafiltration, on the stability of the coffee beverage were also evaluated. AS

Fruit juices

Apple juices

466

Wu (ML), Zall (RR) and Tzeng (WC). **Microfiltration and ultrafiltration comparison for apple juice clarification.** *Journal of Food Science* 55(4); 1990; 1162-1163

Unpasteurized raw apple juice processed by microfiltration (MF) or ultrafiltration (UF) was evaluated for quality and the methods compared for process efficiency. Juice permeate was analyzed for total solids, soluble solids, colour, turbidity, pH and acidity. Apple juice processed by MF was significantly (P) darker, more turbid, contained higher total and soluble solids than juice processed with UF, and was preferred by a taste panel. MF processed more permeate per unit time than UF under similar operating conditions with no noticable difference in power consumption (watt-hr/L). AS

Citrus juices

467

Nussinovitch (A) and Rosen (B). **Cloud destruction in aseptically filled citrus juice.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 60-64

The present work deals with the problem of cloud loss in aseptically filled (AF) bottled citrus juice in a commercial plant. In this note the problem as well as the attempts to identify the causing agents are discribed. When examined aseptic bottles withdrawn from industrial cold storage, classification is observed in high percentage of bottles. Juices were inoculated with microorganisms which had been isolated from the production system. It was evident that only molds were able to classify juices, through extracellular enzymes. The activity of these enzymes are studied except for an increase in methanol content, no chem. changes were found in the clarified juice. The probable source of contamination could be the fruit

itself. The equipment or the atm. surrounding the processing line. Spores of molds when present in aseptic filled juice offer a real damage to future quality of the product. 15 references. AS

468

Rezaaiyan (R) and Nikdel (S). **A comparison of mineral extraction techniques of citrus juices as analyzed by inductively coupled plasma atomic emission spectrometry.** *Journal of Food Science* 55(5); 1990; 1359-1360

Two methods of mineral extraction for citrus juices were investigated: dry ashing in a muffle furnace and wet ashing in a microwave oven. Elemental concn. were determined by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES). For reference, a synthetic multielement mixture was prepared and analyzed. Results for the multielement solution using wet ashing in a microwave oven or dry ashing in a muffle furnace differed by less than 10% from those for an undigested, but diluted solution. As exception was boron, of which 96% was lost in the muffle furnace. Grapefruit juice analysis showed differences in concn. of less than 10% for all elements. Orange juice samples, however, showed greater losses for Na (16%), Si (13%), and Sn (11%) with the dry ashing method. AS

Orange juices

469

Sadler (G), Parish (M) and Davis (J). **Diacetyl measurement of orange juice using differential pulse polarography.** *Journal of Food Science* 55(4); 1990; 1164-1165

Reconstituted single strength orange juice was distilled to recover diacetyl. 0.5 mL of 1N LiOh was added to 4.5 mL of distillate. Using a static mercury drop electrode, a current vs potential scan was performed between -0.7 and -1.10 vs an Ag/AgCl reference electrode. The reduction potential for diacetyl was -0.83 V. Peak heights were proportional to concn. throughout the test range(8.3 p.p.b to 1 p.p.m). Diacetyl recoveries were approx. 85%. AS

Pineapple juices

470

Bowden (RP) and Isaacs (AR). **Concentration of pineapple juice by reverse osmosis.** *Food Australia* 41(7); 1989; 850-851

Pineapple juice was concentrated from 130 g/kg to 250 g/kg soluble solids in pilot scale tubular and plate-and -frame reverse osmosis units. Factors investigated were clarification, operating temp., membrane types, flow rate, pressure and concn. level. Permeate flux average 20 L/m^2h, and was affected by all factors except clarification. Losses of soluble components into the permeate were very slight, and flavour of the reconstituted juice was comparable with single strength juice. Cloudy pineapple juice can be concentrated up to 250 g/kg soluble solids at 6000 kPa pressure, 40 C, and a flow rate of 3 m/sec, with good quality retention. AS

FATS AND OILS

Fats

471

Karovicova (J), Simko (P) and Pribela (A). **Fatty acids of *Sambucus nigra* and *Sambucus ebulus*.** *Die Nahrung* 33(6); 1989; 599-600

472

Mieth (G), Elsner (A) and Engst (W). **On the synthesis and characterization of sucrose fatty acid polyesters. Part 2. Modification of the synthesis of sucrose fatty acid total esters for obtaining surface-active low-energetic fat substitute.** *Die Nahrung* 33(6); 1989; 517-525 (De).

A modified process is described for the alkali metal catalyzed synthesis of sucrose fatty acid total esters (STE) by interesterification of sucrose octaacetate with triglycerides in absence of solvents STE are formed with yields of about 52% at following conditions: molar ratio of triglyceride to sucrose octaacetate 3.5:1, reaction temp. 120 C, reaction time 4 h, and catalyst concn. of 1.5% alkalimetal. The purified surface active final products are only partially digestable. Therefore they are recommended as fat substitutes for low-caloric food. AS

Shortenings

473

Moziar (C), deMan (JM) and deMan (L). **Effect of tempering on the physical properties of shortening.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 238-242

A study was conducted to determine physical changes that take place in shortening due to tempering. Shortening was tempered at 10, 23, 26.5, and 30 C for 2 days or 9 days, and then stored at 23 C. Solid fat content was measured by pulsed NMR. Polarized light-microscopy was used to monitor crystal growth. The polymorphic transitions were followed by X-ray diffraction and

quantified using soft laser scanning densitometry. The change in melting behaviour was evaluated by differential scanning calorimetry. Results indicate that transitions of beta prime to beta polymorphic forms can be delayed as a result of tempering. Firmness and hardness were evaluated using an Instron Universal Testing Machine and a cone penetrometer resp. Tempering influence the degree to which firmness or hardness increases. AS

Oils

474

Lahtinen (ST) and Ndabikunze (BK). **Effect of salt substitutes on the autoxidation of oil and lipophilic substances in mayonnaise.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 99-100

Mayonnaise that contained 0.85% or 1.45% wt./wt. of either NaCl, Morton Lite Salt(50% wt./wt. NaCl, 50% KCl) or Mineral Salt (65/% NaCl, 25% KCl, 10% magnesium sulphate heptahydrate) were monitored over a period of 60 days. It was observed that both salt concn. and salt type had a remarkable influence on the anisidine value. When combined with 0.01% butylated hydroxytoluene and 0.01% butylated hydroxyanisole, the salts produced a lower or equal, or in one case a higher, anisidine value, as compared to mayonnaises without antioxidants. AS

475

Philip Handel (A) and Guerrieri (SA). **Evaluation of heated frying oils containing added fatty acids.** *Journal of Food Science* 55(5); 1990; 1417-1420

Frying oils (corn, lightly and highly hydrogenated soybean and tallow) were heated for 24 h at 200 C and acid value and percentage polar compounds measured. Fatty acids (stearic, oleic and linoleic) were added to the oils at 1 and 5% levels to determine their effect on oil quality. Corn oil formed acidic and polar compounds at faster rates than the other oils. With 5% fatty acids added, acid value decreased because acidic compounds evaporated faster than they were formed. Polar compounds formation generally increased with fatty acid addition in corn oil and lightly hydrogenated soybean oil and decreased in highly hydrogenated soybean oil and tallow. AS

476

Tasioula-Margari (M), Komaitis (M) and Kontominas (MG). **Investigation by fractional crystallization of classes of compounds formed during frying of vegetable oils.** *Food Chemistry* 36(4); 1990; 295-304

In an effort to standardize a rapid and reliable method for the characterization of thermally abused vegetable oils, the technique of fractional crystallization was applied to heated samples of cottonseed and corn oil. Using this method an insoluble fraction enriched mainly in polar compounds, which form during the heating process, was obtained. These compounds, mostly of high mol. wt., are responsible for the increase in viscosity of the oil and are retained in a gas chromatographic column used for fatty acid methyl ester analysis. It was found that the above insoluble fraction formed when heated samples contained 25% polar constituents, a value which is widely accepted as the upper limit for use of heated vegetable oils. It is proposed that the technique of fractional crystallization can be used as a method for rapid quality assessment of frying oils such as non-hydrogenated vegetable oils. AS

477

Yoshida (H), Hirooka (N) and Kajimoto (G). **Microwave energy effects on quality of some seed oils.** *Journal of Food Science* 55(5); 1990; 1412-1416

Effects of microwave heating were investigated on chem. properties of seed oils in relation to tocopherol contents. For assessing quality of oils (linseed, soybean, corn, olive, and palm) during microwave treatments, peroxide, thiobarbituric acid, carbonyl and anisidine values were determined. As the amount of polyunsaturated fatty acids in oils increased the index for the chem. properties increased. After 8-10 min heating the amount of tocopherols decreased substantially in linseed, olive and palm oils, whereas that in corn and soybean oils was still ca. 90%. Thus, the reduction in tocopherols in oils is not necessarily in agreement with chem. properties of the oils. AS

Palm oils

478

Aletor (VA), Ikhena (GA) and Egharevba (V). **The quality of some localy processed Nigerian palm oils. An estimation of some critical processing variables.** *Food Chemistry* 36(4); 1990; 311-317

The qualities of palm oils obtained from four different indigenous processing techniques were assessed with respect to the free fatty acid(FFA) content, peroxide value, moisture content and impurity levels. Four oil samples, designated A-D were analysed, three of which were locally processed using the traditional methods while the fourth was processed mechanically. Although the techniques investigated are prevalent in Oshimill Local Government Area of Bendel State, they are also practised elsewhere in Nigeria. The

mechanically-processed palm oil (Sample A) had the lowest FFA content of 4.90% followed by 7.04, 9.98 and 12.24% resp., for samples C, D and B. The peroxide values ranged from 2.70 meq kg^{-1} in sample B to 7.40 meq kg^{-1} in sample C. The mechanically extracted oil had the highest residual moisture of 2.96% while sample D had the lowest value of 0.43%. Generally, the impurity levels were highest in the traditionally processed oils. Distinct variabilities were observed with respect to all the parameters estimated, due to differences in the processing methods. Some measures, which include sterilization of fruits soon after harvest and the use of more efficient filtering methods, are suggested to enhance the quality of the traditionally processed oils. AS

479

Yap (PH), deMan (JM) and deMan (L). **Chemical and physical properties of palm oil and palm olein as affected by hydrogenation.** *Canadian Institute of Food Science and Technology Journal* 22(3); 1989; 243-248

Palm oil and palm olein were hydrogenated with a commercial nickel catalyst at 175 C and 103 kPa hydrogen pressure. The hydrogenation rate was higher with palm olein. With palm oil the max. level of *trans* isomers, 19% was obtained at iodine value 27. With palm olein the max. *trans* level was 24% at iodine value 31. Dropping points, solid fat content and thermal analysis data for the hydrogenated products are presented and interpreted. AS

Rice bran oils

480

Sriodhara (S). **Isolation and characterization of a proteolipid in defatted rice bran.** *Die Nahrung* 33(6); 1989; 565-573

A proteolipid was isolated from defatted rice bran by the method of Folch et al. The complex contained lipid and protein in the ratio 1:2 by wt. The apoprotein of the proteolipid was found to be made up of four different polypeptides as indicated by sodium dodecyl sulphate(SDS) and SDS-urea polyacrylamide gel electrophoresis. The apoprotein was hydrophobic in nature and contained a high proportion of apolar amino acids. The lipid moiety of the proteolipid chiefly contained glycolipids and phospholipids and little of neutral lipids. It is suggested that proteolipids may be part of oleosomal membranes, which surround oil bodies in cereals and oilseeds. AS

Soybean oils

481

Guth (H) and Grosch (W). **Comparison of stored soybean and rapeseed oils by aroma extract dilution analysis.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 59-65

Three soybean oil (SBO) samples and one rapeseed oil sample were stored at room temp. After 30 days, off-odours of different intensities had developed. (Z)-3-hexenal, 1-octen-3-one, (Z)-1,5-octadien-3-one, 1-octen-3-hydroperoxide, (Z)-1,5-octadien-3-hydroperoxide, (E)- and (Z)-2-nonenal, 3-methyl-2, 4-nonandione, trans -4-5-expoxy-(E)-2-decenal and an unknown compound were evaluated by aroma extract dilution analysis as primary odourants of the three SBO samples which were exposed to daylight. The major differences in the intensity of the reversion odour of the three SBO samples were mainly due to an increase in the concn. of 3-methyl-2-, 4-nonandione during storage. Trans-4,5-expoxy-(E)-2-decenal was the main cause of the green, hay-like odour of a SBO sample which had been stored in the dark. The rapeseed oil sample stored in daylight contained (Z)-1,5-octadien-3-hydroperoxide, (Z)-2-nonenal, an unknown compound and 1-octen-3-hydroperoxide as primary odourants. AS

482

Jung (MY) and Min (DB). **Effects of α-, γ-, and δ-tocopherols on oxidative stability of soybean oil.** *Journal of Food Science* 55(5); 1990; 1464-1465

The effects of 0, 100, 250, 500 and 1000 p.p.m. of α-, γ-, δ- tocopherol on oxidative stability of purified soybean oil in the dark at 55 C were studied. The peroxide value and headspace oxygen consumption in the samples was measured. Purified soybean oil was prepared by liquid column chromatography. Tocopherols acted as antioxidants or prooxidants depending on their concn. Optimum concn of α-, γ-, δ- tocopherols to increase oxidative stability was 100, 250, 500, 1000 p.p.m. resp. The tocopherols had significant prooxidant effect (P 0.05) at higher concn above this. AS

Sunflower oils

483

Lange (E), Mieth (G) and Pohl (J). **Comparative studies on the quality of crude oil and protein isolates produced by traditional and novel technologies. Part I. Raw material and process specific influence on the composition of crude oil from sunflower seeds.** *Die Nahrung* 33(6); 1989; 527-539 (De).

The production of crude oils from sunflower seeds based on traditional technologies of pressing or

prepressing and extraction as well as novel technological developments of direct extraction and displacement extraction is described. The quality of the oils is judged on the basis of their contents of valuable and detrimental constituents. Traditionally produced crude oils are in conformity with general qualitative requirements. Oils from the direct extraction are especially suitable for the production of food lecithin because of their high content of phospholipids, whereas oils from displacement extraction meet all requirements on semi-raffinates due to the extreme low contents of phospholipids and the low content of dyes. Critical steps regarding changes in the comp. of the crude oils are conditioning, pressing, and miscella destillation in the traditional technologies, hydrothermic pretreatment in the direct extraction procedures as well as conditioning, mechanolytical cell destruction, and emulsion breaking in the displacement extraction procedures. AS

484

Mieth (G), Lange (E) and Pohl (J). **Comparative studies on the quality of crude oils and protein isolates produced by traditional and novel technologies. Part 2. Raw material and process-specific influence on the composition of crude oils from sunflower seeds.** *Die Nahrung* 33(6); 1989; 541-548 (De).

Crude oils from sunflower seeds produced by traditional (pressing and pre-pressing/extraction) and novel (direct extraction and displacement extraction) technologies are judged regarding their hydration behaviour and their oxidative stability. Crude oils from direct extraction show a high content of phospholipids, a large part of which is able to be removed by hydration and serves as a basis for food lecithin production. On the contrary, in the displacement extraction procedure the phospholipids are separated during the production process, therefore the oils are predestinated for physical refining. Regarding the oxidative stability clear differences appear between the oils produced by different method but raw material specific influence are dominant compared with process-specific ones. AS

SPICES AND CONDIMENTS

485

Vernin (G), Metzger (J), Suon (K-N), Fraisse (D), Ghiglione (C), Hamoud (A) and Parkanyi (C). **GC-MS SPECMA bank analysis of essential oils and aromas. GC-MS (EI-PCI) data bank analysis of sesquiterpenic compounds in juniper needle oil-Application of the mass fragmentometry SIM technique.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 25-33

A sesquiterpenic fraction of *Juniperus communis* L. oil (needless) from south-eastern France was investigated by means of the GC (FID), GC-MS electron impact (EI), and positive chemical ionization (PCI) techniques. The fractions were identified on the basis of out SPECMA data bank (mass spectra and Kovats indices) and our own files. Among more than a hundred isolated constituents 64 were sesquiterpenic compounds. The main ones were: γ-cadinene, (E)-β-elemene, (E)-α-cadinol, germacrene D, α-muurolene, spathulenol, calamenene, T-cadinol and α-humulene. Furthermore, the presence of several alcohols and oxygen-containing derivatives based on the calamenene and calacorene isomers was established but their structures were not fully determined. The behaviour of all these compounds in PCI was discussed. Using the technique of selected ion monitoring (SIM) to mass fragmentometry, a differentiation of most categories of sesquiterpenic derivatives was achieved. AS

486

Whorton (C) and Reinecius (G). **Current developments in microwave flavours.** *Cereal Foods World* 35(6); 1990; 553-559

This article covers the developments that have taken place in microwave technology in the food and flavour industries. PHR

Spices

487

Bahk (J), Yousef (AE) and Marth (EH). **Behaviour of *Listeria monocytogenes* in the presence of selected spices.** *Lebensmittel-Wissenschaft und - Technologie* 23(1); 1990; 66-69

Behaviour of *Listeria monocytogenes* strain V7 was determined in the presence of 0.5% of selected sp. (onion, garlic, mustard, cinnamon or clove) or 0.1% or 0.3% of herbal constituents (red or white ginseng saponin). Cultures were incubated at 4 C or 35 C. Growth curves were constructed by fitting the data to a logistic model and growth parameters were calculated. Type and extent of inhibition of *L. monocytogenes* depended on kind of spice and temp. of incubation. Cinnamon and clove inhibited *L. monocytogenes* to a greater extent than did the other spices Clove had more pronounced bacteriostatic and bactericidal effects. In contrast, ginseng saponins had a minor overall effect on growth of pathogen. Refrigeration synergistically enhanced inhibition of *L. monocytogenes* by some of the spices *Bacillus* sp. isolated from mulberry extract, when grown on an agar medium seeded with *L. monocytogenes*, formed colonies surrounded by

wide zones where growth of *L. monocytogenes* was prevented. AS

488

Paakkonen (K), Malmsten (T) and Hyvonen (L). **Drying, packaging, and storage effects on quality of basil, marjoram and wild marjoram.** *Journal of Food Science* 55(5); 1990; 1373-1377, 1382

Sorption isotherms, colour and sensory qualities of basil (*Ocimum basilicum* L.) and marjoram (*Origanum majorana* L.) and sensory qualities of wild marjoram (*Origanum vulgare* L.) were used to determine effects of packaging, storage temp. and time on air-dried and freeze-dried herbs. Sorption isotherms showed herbs dried with different methods exhibited different sorption capacities. Both odour and taste of freeze-dried basil and the freeze-dried and air-dried marjorams were very sensitive to storage conditions. Processing and storage conditions had only moderate effects on flavour of wild marjoram. The study demonstrated that quality of dried basil, marjoram and wild marjoram could be maintained for 2 yr in air-tight packages at room temp. AS

Ginger

489

Spiro (M), Kandiah (M) and Price (W). **Extraction of ginger rhizome. Kinetic studies with dichloromethane, ethanol, 2-propanol and an acetone-water mixture.** *International Journal of Food Science and Technology* 25(2); 1990; 157-168

The kinetics of extraction of [6]-gingerol from ground Jamaican ginger rhizome have been determined at 30 C in dichloromethane, ethanol, isopropanol and an 80% (v/v) acetone + 20% (v/v) water mixture. The extractions all proceeded in three stages: an initial 'washing' stage, a fast stage and a subsequent much slower stage. The rate of extraction of hexahydrocurcumin in ethanol was found to follow a simpler pattern. From the first order plots, the diffusion coeff. of the extracted solubles within the ginger particles were calculated. The varied inversely with the 0.6 power of the solvent viscosity, which explained why the rates of [6]-gingerol extraction decreased in the sequence: acetone acetone + water dichloromethane ethanol isopropanol. These results show that solvents of low viscosity should be chosen to attain fast extraction rates. The diffusion coeff. of [6]-gingerol was also measured at 30 C in pure acetone, ethanol and isopropanol. The values in these bulk solvents were 13-20 times greater than the diffusion coeff. of [6]-gingerol within the ginger particles for the fast stage and over 900-1800 times greater than those for the slow stage. These hindrance factors quantify the effect of the ginger matrix environment on internal diffusion. AS

Paprika

490

Drdak (M), Greif (G) and Kusy (P). **Comparison between the sensory and spectrophotometric method for the determination of colour of paprika powder.** *Die Nahrung* 33(8); 1989; 737-742

The paper relates to the study of objective evaluation possibility of the colour of powdered spice-grade paprika based upon the comparative assessment of mutual dependences between colours evaluated by sensory methods, and colour parameters measured by a MOMCOLOR (MOM, Budapest) colorimeter using the three-range method. The measured values of the trichromatic components were calculated in 6 colour spices including the corresponding colour differences and correlated with the sensory evaluation results. It was found that the dependence between the sensory evaluation and the colour parameters, under the assumption of a linear relationship, was significant for the trichromatic Z component, x coordinates, and the Y/x ratio as well as the calculated colour differences. The multiple correlation and regression analysis has shown a statsitically highly significant dependence of the measured X, Y, Z values and the sensory evaluation results (r = 0.7668). AS

Pimento

491

Pino (J), Rosado (A) and Gonzalez (A). **Analysis of the essential oil of pimento berry (*Pimenta diocia*).** *Die Nahrung* 33(8); 1989; 717-720

The volatile constituents of pimento berry oil were prefractionated by liquid-solid chromatography and identified by coupled gas chromatography-mass spectrometry. A total of 29 constituents were identified, including camphene, β-phellandrene and guaiene, hitherto not reported in the oil. AS

SENSORY EVALUATION

492

Best (DJ). **Multiple comparisions for ranked data** *Journal of Food Science* 55(4); 1990; 1168-1169

Multiple comparision for ranked data should be caried out in the same manner as they would be for continuous, normally sdistributed data rather than by use of published tables. A simple example and computer simulations support this approach. AS

493

Ennis (DM). **Relative power of difference testing methods in sensory evaluations.** *Food Technology* 44(4); 1990; 114, 116-117

494

Runyon (CH) and McCarthy (KL). **Determining viscosity of fluid foods by continuous lift.** *Journal of Food Science* 55(4); 1990; 1170-1171, 1173

The viscocity of Newtonian and non-Newtonian fluid foods was determined by analyzing flow characteristics of corn syrup, tomato sauce and pear puree using a continuous lift apparatus. Assuming steady state and film thickness constant with time, the experimental sample viscocities were found by recording film thickness, belt speed and fluid density and applying the power law model. Film thicknesses increased with belt speed. Consistency coefficients from 38 to 134 were obtained. The experimental power law values were reproducible and agreed with those obtained by conventional viscometer. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

495

Daeschel (MA), McKenney (MC) and McDonald (LC). **Bacteriocidal activity of *Lactobacillus plantarum* C-11.** *Food Microbiology* 7(2); 1990; 91-98

Plantaricin A, a bacteriocin produced by a strain of *Lactobacillus plantarum* C-11 isolated from a cucumber fermentation was shown to bacteriocidal against some sp. of 4 genera of lactic acid bacteria, viz, *Lactobacillus, Leuconostoc, Streptococcus* and *Pediococcus* in a spot test using diffusion technique. The bacteriocin was non-dialysable (8,000 MW), active in pH range of 4.0-6.5 and was heat -stable (30 min at 100 C); it was degraded by proteases. Mutants of *L. plantarum* devoid of bacteriocin activity isolated from chemostat cultures had identical plasmid profiles to that of the bacteriocin producing parent strain. NK

BIOCHEMISTRY AND NUTRITION

Biochemistry

496

Baer (A). **Significance and promotion of sugar substitution for the prevention of dental caries.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 46-53

This review covers the following aspects: principles of caries prevention; public health problem of dental caries; the role of sucrose and other sugars ion caries formation; caries preventive effect of partial sugar substitution and the promotion of dentally safe, sugar substituted sweets. 68 references. BV

497

Blendford (D). **Functional proteins.** *Food* 11(10); 1989; 55, 57, 59

498

Gregory (JFIII) and Leatham (K). **Lack of vitamin B6 activity of 6-hydroxypyridoxine** *Journal of Food Science* 55(4); 1990; 1143-1146

Hydroxylation of the C-6 position of pyridoxine has been described recently as the mechanism for the degradation of vitamin B6 in foods. The nutritional properties of the resulting 6-hydroxypyridoxine in mammals have not been previously evaluated. 6-Hydroxypyridoxine was synthesized and its structure confirmed by UV and NMR spectroscopy. A rat bioassay with multiple dose levels was conducted to compare the vitamin B6 activity of pyridoxine and 6-hydroxypyridoxine with respect to a variety of indices of vitamin B6 metabolism. By all criteria employed, 6-hydroxypridoxine exhibited neither vitamin B6 nor antivitamin B6 activity and, thus, is nutritionally inert. AS

499

Karovicova (J), Pribela (A) and Buchtova (V). **Amino acids in the juice of *Sambucus nigra and Sambucus ebulus.*** *Die Nahrung* 33(6); 1989; 593-594

500

Kell (G) and Steinhart (H). **Oxidation of tryptophan by hydrogen peroxide in model systems.** *Journal of Food Science* 55(4); 1990; 1120-1123, 1132

Degradation reactions of tryptophan (trp) and the dipeptides alanyltryptophan (ala-trp) and phenylalanyltryptophan (phe-trp), induced by hydrogen peroxide, were invstigated under different conditions in aqueous systems. Decreases in the ciontent of irp as well as the formation of soluble generationproducts were determined. Highest losses of trp were obtained after hydrogen peroxide treatment at 100 C for 2 hr at pH 8.5. Lowest losses occured at pH 4.0, 25 C, for 30 min. The destruction of trp in ala-trp was similar, while losses of trp in pre-trp under the same reaction conditione were

lower. This was indicative of a negative induction effect of phenyl ring. The quantity of degradation products showed extensive variations, dependent upon the radical mechanism of the oxidation reaction. AS

501

Schweizer (TF). **Dietary fibre analysis.** *Lebensmittel-Wissenschaft und - Technologie* 22(2); 1989; 54-59

This review mainly focuses on the recent efforts to improve routine methods for food quality control and for food labelling of either total dietary fiber or of insoluble and soluble fibres separately. Definition of dietary fibre, analytical principles and objectives, plant cell-wall methods, enzymatic-gravimetric methods, chemical methods, separate detn. of insoluble and soluble fibres are the aspects covered. 49 references. SRA

Nutrition

502

Lake (C). **Vitamins-health or hazard?** *Food* 11(11); 1989; 24-25

TOXICOLOGY

503

Banasiak (U), Beitz (H) and Travieso Santalla (A). **On the residual behaviour of ethephon in fruit, coffee and sweet pepper.** *Die Nahrung* 33(8); 1989; 779-788 (De).

After application of Flordimex to soft and stone fruit for fruit abscission and acceleration of ripening obvious Ethephon residues have been found. Therefore, the dose rate has to be restricted to keep the max. residue limit. The same is true for the use of Flordimex for fruit abscission in apples whereas for yield regulation residues are far below 0.05 mg/kg in apples. A typical feature of the active ingredient is the large quantity of its residues in juice and wine, which is as high as Ethephon concn. in fruits or even higher. Finally, Ethephon is demonstrated to enter the pulp of bananas, mandarin, grapefruit and mango as a result of treating harvested tropical fruit. The residue situation after treatment of pineapple, sweet pepper and coffee is discussed. AS

504

Khemani (S), Khemani (LD) and Pnat (MC). **Toxicological effects of selected pesticides on brain acetylcholine/st erase (AChE) activity in rats.** *Indian Journal of Environmental Health* 32(1); 1990; 39-44

The brain AChE activity decreases with increasing age and wt. of rats. Short- and long-term exposures of rats of carbamate and organophosphate groups of pesticides show considerable inhibition of brain AChE activity. Elsan, at all concn. and duration of treatment studied, inhibited the AChE activity maximally and most significantly. Acute oral and short-term (15 days) ingestion with pesticides bring about nearly the same degree of brain AChE inhibition. A marked recovery in the brain AChE activities of rats exposed to different pesticides for long period (60 days) occurs, although enzyme activities does not return to the pre-exposure levels. Such an inhibition of brain AChE activity results into accumulation of this neurotransmitter in abnormal amounts. This behaviour of the pesticides might also result in increased rhythmic activities of smooth muscles, heart muscles, oesophagus, trachea and blander as well as contraction of the skeletal muscles. The vagus activity may also become highly stimulated. Since the rat metabolism closely resembles to that of human being, these pesticides can affect the human brain too. AS

505

Ozierenski (B), Plass (R) and Lewerenz (HJ). **Early indicators of kidney injury in male and female rats after oral administration of cadmium.** *Die Nahrung* 33(6); 1989; 583-591 (De).

The effect of Cd of the urinary excretion of glucose, creatinine and enzymes has been studied in adult male and female rats given the substance (70, 140 and 280 mg/kg food) for 4 wks. Renal function tests and gel electrophoresis of urinary proteins were conducted simultaneously. Sex-dependent differences were demonstrated with regard to sensitivity of several kidney parameters and their predictive character of a possible chronic nephrotoxicity. These results were compared with hematological and general biological examinations of Cd toxicity. AS

Bacteria

Clostridium botulinum

506

Hauschild (AHW). ***Clostridium botilinum toxins.*** *International Journal of Food Microbiology* 10(2); 1990; 113-124

Structure, activation, destruction, lethality, genesis, neurotoxic action and medical application of botulinal toxins are reviewed. AS

Clostridium perfringens

507

Granum (PE). ***Clostridium perfringens toxins involved in food poisoning.*** *International Journal of Food Microbiology* 10(2); 1990; 101-102

FOOD LAWS AND REGULATIONS

508

Harris (JG). **Food standards-a personal view.** *Food Australia* 41(7); 1989; 834-836

509

Rowse (A). **Quality of food exports. Regulatory control systems.** *Food Australia* 42(2); 1990; 92-94

Regulatory control of the quality of food exports is the responsibility of the Australian Quarantine and Inspection Service (AQIS). Food poisoning, spoilage and zoonotic diseases are controlled by excluding unhealthy animals and animal products from the food chain, by minimising contamination during processing and by retarding outgrowth of pathogenic and spoilage organisms during storage. AS

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